29th Annual. . .

SOUTHEAST SOUTH DAKOTA
EXPERIMENT FARM
BERESFORD

PROGRESS REPORT 1989

Agricultural Experiment Station
South Dakota State University

Brookings

This twenty-ninth annual report of the research program at the Southeast South Dakota Research Farm has special significance for those engaged in agriculture and the agriculturally related businesses in the ten county area of Southeast South Dakota. The results shown are not necessarily complete or conclusive. Interpretations given are tentative because additional data resulting from continuation of these experiments may result in conclusions different from those based on any one year. Trade names are used in this publication merely to provide specific information. A trade name quoted here does not constitute a guarantee or warranty and does not signify that the product is approved to the exclusion of other comparable products.

South Dakota Agricultural Experiment Station
Brookings, South Dakota 57007

Dr. David Bryant, Dean | Dr. R. A. Moore, Director

THE SOUTHEAST SOUTH DAKOTA EXPERIMENT FARM CORPORATION

BOARD OF DIRECTORS

MEMBERS	COUNTY	ADDRESS
Frank Orr, President	Clay	Meckling
John Olbertson, Vice-President	Lincoln	Beresford
Merlyn Smeenk, Treasurer	Lincoln	Harrisburg
John Gille, Secretary	Union	Elk Point
John Ludens	Turner	Davis
Terry Dolan	Union	Beresford
Willie Huebner	Union	Akron, IA
Merlin Peterson	Yankton	Irene
Sidney Abild	Clay	Wakonda
Leon Jorgensen	Turner	Freeman
Darrell Edelman	Hutchinson	Menno
Robert Anderson	Lincoln	Hudson
Joe Uherka	Charles Mix	Wagner
Wayne Burkhart	Minnehaha	Dell Rapids

THE COOPERATIVE EXTENSION SERIVCE

Mylo Hellickson, Acting Director

COUNTY EXTENSION AGENTS OF THE SOUTHEAST AREA

COUNTY	AGENT	ADDRESS
Bon Homme	Steve Sutera	Tyndall
Charles Mix	Daniel Dvorak	Lake Andes
Clay	Ron Thaden	Vermillion
Douglas	Roger Barrick	Armour
Hutchinson	Steve DeHoogh	Olivet
Lincoln	Jeff Lounsbery	Canton
Minnehaha	Steven Munk/ Craig Rosenberg	Sioux Falls
Turner	Merlin Pietz	Parker
Union	John Gille	Elk Point
Yankton	Darwin McGhee	Yankton

Larry Tideman, Program Leader, Ag & Field Operation
Les Schoffelman, Southeast DES
Lloyd Hansen, Extension Program Development Coordinator

TABLE OF CONTENTS

TABLE OF CONTENTS

Visitation and Field Tours

The Southeast Research Farm located six miles west and three miles south of Beresford, is open to anyone interested or involved in agriculture. There is someone at the farm each weekday that would be glad to show you around the research areas and facilities. If a weekday is not possible - maybe a weekend visit would be more convenient. With just a phone call, we would be glad to take you around at your leisure. Or just feel free to drive on the farm and look around the crop areas, if you are interested in something particular. Do not feel like the only time you are welcome at the farm is at tours and field days. We are happy to have you stop by anytime.

During the past growing season, several events were held for the public. Two judging contests were held at the farm in 1989. One was for FFA students in southeast South Dakota, and the other was for 4-H members from the surrounding counties.

Agronomic activities, at the research farm in 1989, consisted of several tours and demonstrations throughout the growing season. A ridge-till planting and cultivating demonstration was held in May, to give farmers of the area the opportunity to see how ridge-till equipment works for planting and cultivation. The Twilight Crop Tour was held in late June, with a tremendous turnout of 500 farmers from a four state area. During that week a tour was held for chemical and fertilizer dealers, with approximately 150 dealers in attendance to view research and get hands-on experience in identifying problems in the field.

Later in the growing season, a tour was held for the South Dakota Ridge-Till Association to show some of the work on the research farm pertaining specifically to ridge-tillers. The Fall Field Day was held in early September, with a good number in attendance to view a large portion of the research being conducted in 1989.

The research conducted each year and included in this report consists of many hours of work by staff from several disciplines at the college and at the SE Farm. Their efforts in contributing to this publication each year are greatly appreciated.

I hope you find some information in the report that will benefit you and your operation or business. If there is anything you would like to see included or worked on here at the research farm, feel free to get in touch with me any time, or the Director of the Experiment Station, Dr. Ray Moore.

Dr. Ray Moore, Director
Ag. Experiment Station
SDSU
Brookings, SD 57007
605-688-4149

Dale Sorensen, Manager
SESD Research Farm
RR 3 Box 93
Beresford, SD 57004
605-563-2989

INTRODUCTION.................................Dale Sorensen, Manager

Well, another year is coming to a close and what an exceptional year it was. At harvest, many wondered where did it come from? At the end of December, we will be approximately 8 to 8.5 inches below normal for precipitation in 1989. But, as you page through this report you will see corn yields that were 90 bushels per acre and above, as well as soybean yields from 30 bushels per acre and above. This, in my opinion, tells us a great deal about improvements and changes in technology that have occurred over the past 10 to 15 years. In the late 1960's and through the 1970's, we thought that 100 bushel corn year in and year out was a good yield. Now we can obtain yields like that in a year in which we receive only 16 inches of precip for the entire year. It is amazing.

A good explanation for the yields in our area, is the rainfall that we received in late June and through July. From the 24th of June to the end of July we received, here at the farm, just over 6 inches of rain during that five week period. That timely rain was the primary reason for making the crop that we harvested in 1989. Obtaining these yields can also be attributed to the improvements in genetics of our crops, and other advances in technology.

What will we do next year? That is a question that I have been wondering about for the past couple of months. Soil moisture levels are lower than they were last year at this time. We will end up going into 1990 with approximately 1 to 2 inches of available soil moisture in the top two to three feet of soil. This could be quite critical if April and May are similarly dry as the last couple of years.

Methods of reduced tillage could be more important than any of the past years. As you look through the annual report, take time and consider some of the ridge-till and no-till work in this report. Almost any farmer has the equipment and capabilities to try some of these new management techniques. Planting corn into soybean stubble without working it in front of the planter is just one. Minimizing passes in the field from a cost standpoint, as well as a moisture conservation standpoint, could be equal in importance. Every bit of moisture that can be held in the profile could be the difference between some crop or none at all.

I would like to take this time to thank Roland Hanson who has decided, as of the end of December, to leave the research farm to pursue other opportunities. Over the past ten years, he has provided a significant level of assistance and input to research at the farm that will be missed in the future. We want to thank him and wish him good luck in the future.

Table 1. Temperatures at the Southeast Research Farm - 1989

Month	1989 Ave Temperatures (F)[a] Maximum	Minimum	30-year Average Maximum	Minimum	Departure From 30 Year Average Maximum	Minimum
January	38.8	14.4	26.3	3.5	+12.5	+10.9
February	23.1	-0.6	32.3	10.2	- 9.2	-10.8
March	41.2	20.4	44.9	23.1	- 3.7	- 2.7
April	63.7	34.8	62.7	36.4	+ 1.0	- 1.6
May	73.0	45.6	75.1	48.7	- 2.1	- 3.1
June	80.0	54.6	84.7	58.6	- 4.7	- 4.0
July	87.9	64.8	89.9	63.7	- 1.9	+ 1.1
August	83.2	60.0	87.6	60.4	- 4.4	- 0.4
September	74.8	47.2	77.5	49.9	- 2.7	- 2.7
October	67.3	33.3	65.5	37.6	+ 1.8	- 4.4
November	43.8	19.4	46.4	24.3	- 2.6	- 4.9
December	20.0	-1.3	30.7	10.5	-10.7	- 9.2

[a] Computed from daily observations

Table 2. Precipitation at the Southeast Research Farm - 1989

Month	Precipitation 1989 (inches)	30-year Average (inches)	Departure from 30 year Ave. (inches)
January	.08	.48	- .40
February	.35	.84	- .49
March	1.15	1.60	- .45
April	1.66	2.48	- .82
May	1.99	3.54	-1.55
June	3.20	4.20	-1.00
July	3.79	3.31	+0.48
August	1.97	3.20	-1.23
September	1.61	2.84	-1.23
October	.21	1.76	-1.55
November	.57	1.11	-.54
December	.39	.72	-.33
Totals	16.97	26.08	-9.11

S.E.FARM
REPORT

DATE OF PLANTING FOR CORN

D. R. Sorensen

Southeast Farm 89-1

Summary

Two corn hybrids (medium and late maturity range) were planted on five dates beginning April 17 and ending May 27. For the earlier of the two hybrids, grain yield was maximized when the corn was planted on May 17 or May 27 when compared to the three earlier planting dates. The late maturing hybrid was different from past years as well. The April 27th and May 17th planting dates were the maximum yield levels in 1989. Past years research has shown that, especially for a late season hybrid, planting needed to be completed by the May 7 planting date to maximize yields.

Methods: Two corn hybrids were compared at five different planting dates in 1989. Pioneer 3732 and 3377 were planted on five dates through April and May. Planting was started when field conditions would allow, and soil temperatures were adequate for germination of corn. Ten day planting intervals were followed from the first planting date, which was April 17 in 1989. Table 1 reports all other management factors for the experiment in 1989.

Table 1. Crop Management Practices for Planting Date Study in 1989.

1988 Crop	Soybeans
Tillage	No-till
Planting rate	21,200 seed/a
Herbicide	2 pt Dual + 2.2 # Bladex EPP
Phosphorus	25# P205 Pop-up
Nitrogen	90# sidedress after emergence
Harvest	October 4

Results and Discussion: The unusually dry winter, again, made it very easy to get this study started in the middle of April. Temperatures were not as ideal, as we have seen in previous years, after the first date was planted. The weather also did something to us it hasn't done in the past few years, with a frost occurring on both May 6th and May 7th. Both nights the low was 29 degrees (F). The April 17 planting date had emerged at that time, and several days later it was quite evident that the corn had been nipped by frost, and a fair amount of the leaf area was frozen. But, as May progressed the corn continued to grow and never really seemed to be set back by the frost.

Yields were considerably better than 1988, but some planting dates seemed to be affected more by the dry conditions in June as compared to other planting dates. Yields for 1989 are reported in Table 2.

Table 2. Effect of Planting Date on Corn Grain Yield, SE Farm, 1989.

Hybrid	Relative Maturity	Planting Date April 17	April 27	May 7	May 17	May 27
		- - - - - - - - - - bu/A @ 15 % * - - - - - - - -				
P - 3732	101	82	89	87	109	100
P - 3377	116	95	105	91	104	82

LSD (.10) = 10 bu/A for differences between planting dates within the same hybrid.

Growth of the early hybrid was limited for the first three planting dates, due to the severe moisture stress during the third week in June. On June 24, we started receiving rain which helped the crop recover, but some yield reduction was unavoidable due to the stress that these planting dates went through. This is the main reason for the significant yield decrease when comparing the May 17 and May 27 planting dates to the three earlier dates. The later planting dates were farther behind in plant development and did not use as much water during the dry conditions, allowing these dates to make even better use of the rainfall that was received in late June and all of July.

The late hybrid was affected differently by the conditions in 1989. In past years, we have always seen a yield decrease after the May 7 planting date. In 1989, the April 27 planting date was significantly higher than all planting dates except for May 17. The May 7 planting date yield was significantly lower than the May 17 date. This must have been due to differences in weather at the time that the planting dates reached tasseling, with the May 7 planting date tasseling under more stressful conditions than the May 17 planting date.

Average yields for the past four years for this experiment are reported in Table 3.

Table 3. Four year averages for Planting Date Study, SE Farm, 1986-1989.

Hybrid	Relative Maturity	Average Planting Date April 15	April 25	May 5	May 15	May 25
		- - - - - - - - - - - bu/A - - - - - - - - - - - -				
P- 3732	101	111	109	114	109	101
P-3377	116	131	132	127	118	91

LSD (.10) = 15 bu/A for differences between planting dates within the same hybrid

Yield levels, over a four year period, are quite respectable for both hybrids. The only significant difference is for the late hybrid, in which the first four planting dates are higher than the last planting date, which would be expected.

Planting corn in the mid and later part of April does make quite a difference in grain moisture content at harvest. The extra growing season that is utilized with the early planting dates, results in being able to grow later maturing hybrids, but have them dry down so that grain moisture is not excessively high at harvest. This also gives you the higher yield advantage, that the late hybrids usually have over early hybrids, as in this study.

S.E.FARM
REPORT

PLANT POPULATIONS FOR CORN

D. R. Sorensen

Southeast Farm 89-2

Summary

Seeding rates and hybrids were tested to determine what the optimum plant population for different corn maturity ranges would be for southeast South Dakota. Three hybrids were tested at six different seeding rates. Grain yields in 1989 were some of the highest reported on the research farm. The early hybrid in this study was obviously affected by the early dry conditions compared to the medium and late maturing corns. Significant yield increases did occur for each of the hybrids when planting rates were increased in 1989.

Methods: Three hybrids were tested at six plant populations in 1989. These are the same hybrids and populations used in past years except for dropping the early hybrid, and the addition of a lower planting rate of 15,000 seed/acre. The hybrids this year were Pioneer 3732, Curry's 1466 and 1490 with actual seeding rates of 15900, 18400, 21900, 24500, 27900 and 30200 seed/acre which are seeding rates closest to the desired rates according to the planter operation manual. Table 1 reports all other management factors for the experiment in 1989.

Table 1. Crop Management for Plant Population Study in 1989.

1988 Crop	Soybeans
Tillage	Ridge-till
Planting Date	April 26
Herbicide	Lasso + Bladex Broadcast Pre
Insecticide	None
Phosphorus	25 lb P205 Pop-up
Nitrogen	90 lb sidedress after emergence
Harvest Date	October 6

Results and Discussion: Yield levels for 1989 were beyond expectations for the amount of moisture received during the growing season. The one key to the crop that was harvested this year, is the timeliness of the moisture we did receive in late June and throughout July. When a rain was needed it was received, with just over 6 inches of precipitation falling from June 24 to July 31. Yields for 1989 are reported in Table 2.

Table 2. Grain Yields for Plant Population Study, SE Farm, 1989.

Hybrid	S. Oak. Maturity	15900	18400	21900	24500	27900	30200
		Seeding Rate					
		- - - - - - - - - bu/acre @ 15% * - - - - - - - -					
Pio 3732	101	97	97	111	108	107	111
Curry 1466	110	110	111	118	124	125	126
Curry 1490	115	138	140	150	148	158	161

LSD .10 = 11 bu/acre for differences between populations within the same hybrid

The large differences in yields observed between the two later maturing hybrids and the early hybrid are typical of what we saw around the farm where different maturing hybrids were used. The late hybrids reached their reproductive stage later in July compared to the early hybrid which tasseled and silked in the early part of July. This early corn went through drought stress at a more critical stage than the later corns. The late corns were stressed the same amount, but were not as close to the critical stage of tasseling, allowing the later corns to make better use of the moisture received in late June and July.

Another factor that contributed to the higher yields in this study was the use of ridge-till. This area has some of the oldest ridges on the farm, they have now been maintained for four years. At planting time, there was a great deal more moisture in the top two inches, compared to some of the conventional tillage/planting that was done on the farm this past spring. Every bit of moisture saved from not doing any fall tillage, or spring tillage prior to planting, was used to produce corn, and not lost through evaporation from the surface when working the soil.

Table 3 reports yields for three hybrids tested at five populations over the past four years.

Table 3. Plant Population Study, Four Year Average Yields SE Farm, 1989.

Hybrid	18,400	21,900	24,500	27,900	30,200
	Seeding Rate				
	- - - - - - - - - Bu/acre @ 15% - - - - - - - - - -				
Pioneer 3732	112	119	118	117	122
Curry 1466	121	128	123	133	126
Curry 1490	141	142	134	143	141

LSD .10 = 10 bu/acre to compare yields between populations within the same hybrid

Because of the slight modifications in the experiment this year, we only have four year averages for three hybrids at five populations. Yield differences between populations are not extremely large when averaging yields over the past four years, but it does show the difference in yield potential between the early and later maturing hybrids. With these averages, the trend still appears to show that for early corns a higher plant population is required to obtain the highest yield potentials possible, while with the later maturing hybrids population is not as critical. The two particular late maturing corns in this study have the capability to alter ear size according to the population and type of growing season that occurs. If the population is on the low end, these corns can set a large ear and if populations are higher ear size is reduced.

Due to the higher expense involved with seed these days, it is critical that the characteristics of each hybrid are known so that there always are enough plants out there to maximize the yield potential of that corn. With some seed corn costing as much as $1/thousand, it is another input that needs to be watched and utilized as wisely and economically as possible, but not shorting a hybrid to hurt its full yield potential.

SOYBEAN POPULATION STUDY

Dale Sorensen

Southeast Farm 89-3

S.E.FARM
REPORT

Summary

A soybean population study was continued in 1989, to continue to monitor the effect seeding rate has on final stands and yields for soybeans. In 1989, conditions were good after planting and no significant crusting problem occurred. Again, as in 1988, there were no significant yield differences between the seeding rates that ranged from 124,000 to 217,000 seeds/acre (40 to 70 lb/acre).

Methods: Due to the extremely dry weather conditions of 1988 the soybean population study needed to be continued. With the drought limiting yield potentials last year, it was not sure that there was a fair test for 1988 and should be run again.

Populations in 1989 were slightly higher than those used in 1988, due to smaller size of this particular seed lot. Seeding rates in 1989 were 123,000, 155,000, 186,000 and 217,000 seeds per acre, which are the equivalent of 40, 50, 60 and 70 lbs./acre of seed, respectively. Plots were seeded at their respective rates on the same day. If soil crusting occurs after planting, stand counts and emergence differences would be measured during and after emergence. All other management practices involved in the study are reported in Table 1.

Table 1. Management Practices for Soybean Population Study
SE Farm, 1989.

Tillage	Ridge-Till
Past Crop	Corn
Herbicide	Lasso Band
Variety	Corsoy 79
Planting Date	May 12
Row Spacing	30 inch
Harvest Date	September 25

Results and Discussion: Soil crusting due to hard spring rains can be a common occurrence in eastern South Dakota. This has not been a problem though, for the last two years, due to the month of May being unusually dry both years. Final stands were adequate and close to what was expected for each seeding rate. Planting on the ridge helped in establishing the good stands due to the optimal moisture conditions found when planting on ridges. Table 2 reports final stand counts on a per acre basis for 1989 stands in pounds/acre, seeds/acre and seeds/foot.

Table 2. Stand Counts for Soybean Population Study
SE Farm, 1989.

Seeding Rate lb/A	Seed/ Acre	Seed/ Foot		Final Stand Plants/Acre	Final Plants/ Foot
40	124,000	7	*	98,750	5.7
50	155,000	9	*	122,750	7.0
60	186,000	11	*	136,250	8.0
70	217,000	13	*	153,500	9.0

Table 3 reports yields for the study in 1989. Again, as in 1988, there were no significant differences in yield between the four different seeding rates.

Table 3. Soybean Yields for Soybean Population Study
SE Farm, 1989.

Seeding Rate lb/A	Yield bu/A @ 13 %
40	40
50	40
60	40
70	40

What this study has shown, is the great potential a variety like Corsoy 79 has for filling in and generating the same yield with over one-third less plants. This would be expected to be consistent for varieties that have similar characteristics. Next year, we will change this study to have a non-branching, shorter variety that seems to be more similar to many of the newer varieties being developed, and planted today.

S.E.FARM
REPORT

DATE OF PLANTING SOYBEANS

D. R. Sorensen

Southeast Farm 89-4

Summary

Soybean yields were considerably higher in 1989 compared to 1988. Trends were slightly more normal than last year, in that yields tended to be higher if the soybeans were planted in May, compared to being planted in June. For Corsoy 79 the first three planting dates in May were all similar with significant yield reductions occurring when planting was delayed into June. For Century 84, yields were significantly lower when planting was delayed any later than the first planting date of May, except for the early June planting date.

Methods: This is the fourth year of a long term study looking at the effect planting date has on soybean yields in southeast South Dakota. As in the past, the study consists of two soybean varieties, (Corsoy 79 and Century 84) planted at five planting dates, each being 10 days apart. This year the first planting date did not get put in much earlier than what we recommend as a safe date to begin planting soybeans in the southeast. Table 1 reports all management practices for the soybean study in 1989.

Table 1. Management Practices for Date of Planting Soybeans, SE Farm, 1989.

Tillage	Ridge-till
Past Crop	Corn
Herbicide	Lasso band
Seeding Rate	54 lb/acre
Harvest Dates	Sept 19 & Oct 2

Harvest, again this year, was performed on two separate dates because of the large differences in maturity dates between the different planting dates. Planting dates were harvested when the dates were dried down and ready for harvest. On September 19, all three of the May planting dates for Corsoy 79 were harvested, as well as the first planting date of Century 84. On October 2, the remaining planting dates were harvested. The yields were all adjusted to 13% moisture, so as to not bias the earlier harvest over the later harvest when the moisture content was lower.

Results and Discussion: Soybean yields in 1989 were much higher again than we thought possible. This again, as in other studies, was due to the timely rains, and the use of ridge-till in the research. Soybeans across the farm were consistently better where no-till or ridge-till was used in the production system compared to conventional methods. Yields for the specific planting dates are reported in Table 2.

Table 2. Planting Date Effects on Soybean Yields in Southeast South Dakota, SE Farm, 1989.

	Planting Date				
Variety	May 8	May 18	May 28	June 7	June 17
	- - - - - - - - - - bu/acre @ 13% - - - - - - - - - - -				
Corsoy 79	38	41	40	34	28
Century 84	35	29	30	32	30

LSD .10 = 4 bu/acre for differences between planting dates within the same variety

Corsoy 79 yielded exceptionally well, with no yield differences between the first three planting dates in May. Those three planting dates were significantly higher than the two June planting dates, and the June 7th date was significantly higher than the June 17th planting date.

Century 84 did not yield as well as Corsoy 79 throughout the study. The last two planting dates did not have any significant differences between yields for the two varieties. Soybean quality would have been different though between the two varieties. The last two dates of Century 84 were caught by the frost that occurred on September 23rd, which at harvest, made for some green beans and could have resulted in some dockage at the elevator. The first planting date of Century 84 was significantly higher than all other planting dates except for the June 7th planting date. This higher yield on the June 7th planting date was caused primarily by variability in the moisture sample of the grain. Common sense would say that a planting date as late as this should be significantly lower in yield for this maturity of soybean.

S.E.FARM
REPORT

SOYBEAN VARIETY ROW SPACING

O. R. Sorensen

Southeast Farm 89-5

Summary

Soybean yields for the variety row spacing study were much better than expected. Differences between row spacings were similar and consistent with results from past years. Corsoy 79 had a significant yield difference between each change in row spacing, whereas the SOI 287 variety did not differ in yield from skip-row to 30 inch rows, but was significantly lower when the row spacing was increased to a 36 inch row-spacing.

Methods: The soybean variety and row spacing study was conducted on the research farm in 1989, with somewhat smaller plots than were used in 1988. This study has been conducted for several years at the research farm with only slight alterations occurring from year to year. Two varieties (Corsoy 79 and SOI 287) were used in the study in 1989 to get the two types of plant characteristics of soybean varieties, tall branching, or shorter non-branching. Three row spacings were used in 1989 consisting of a 15 inch skip-row, 30 inch rows and 36 inch rows. The wide row spacing was added last year because many producers were asking about what benefits they may see when decreasing from wide to 30 inch rows, or even down to the skip-row type of system. Other management practices for the study are reported in Table 1.

Table 1. Management Practices for Soybean Row Spacing Study, SE Farm, 1989.

Tillage	Fall Chisel
Past Crop	Corn
Herbicide	Treflan + Sencor PPI
Planting Date	May 11
Harvest Date	September 25

The planting rates for this experiment are set similar to those used by farmers of the area. Efforts are made to set seeding rates as similar as possible for the different seeding rates. Seeding rates in 1989 for the two varieties were approximately 6, 8 and 10 beans per foot of row for the skip, 30 and 36 inch row spacings, respectively.

Results and Discussion: Yields for 1989 were quite respectable and are reported in Table 2.

Table 2. Soybean Variety and Row-Spacing Yields, SE Farm, 1989.

Variety	Row-Spacing 15" Skip-Row	30" Rows	36" Rows
	- - - - - - - - - - - bu/acre @ 13%	- - - - - - - - - - -	
Corsoy 79	32	30	27
Harvest Pop.	(199,000)	(136,000)	(126,000)
SOI 287	37	37	29
Harvest Pop.	(167,000)	(117,000)	(111,000)

LSD .10 = 3 bu/acre for differences between row-spacings within a variety

For each row-spacing the harvest population is reported below that yield. These counts were taken after harvest to determine if there were any large differences in stands between the row-spacings. As you can see, the 30" and 36" rows were quite similar in final stands, but the skip-row stands were considerably higher in total plants at harvest.

Yield differences for Corsoy 79 were similar to past years with two to three bu/acre differences between the row-spacings. The SOI number is a new variety to this study, and there was a large difference between the 36" rows and the other two row-spacings. The yield level for this soybean at the 30" row-spacing is similar to yields combined on other areas of the farm where that variety was used. The surprising fact, is that there was no advantage to planting this variety in narrower rows. This is only the first year for this variety in the study, so it is hard to make any decisions as to whether this variety needs to be planted in rows narrower than 30" to maximize yields.

Starting in 1990, we will have a new drill at the farm which will give us the capability to expand this research to include more varieties, as well as allow us to match seeding rates more closely between row-spacings. Also, with the newer herbicides, I feel that narrow row soybeans, (drilled in 7 inch to 15 inch rows) may be even more feasible than in the past due to excellent, all season, weed control. Although the cost of some of these newer herbicides are higher than some of the old stand-bys, the yield advantages of narrower rows, and no cultivation, may quite easily offset the increased costs.

S.E.FARM
REPORT

FABABEAN RESEARCH

D. R. Sorensen

Southeast Farm 89-6

FABABEAN RESEARCH PROJECT

Fababeans were again studied at the Southeast Research Farm to determine their adaptability to South Dakota. Four different varieties of fababeans were grown to determine if there were differences between varieties as far as weather effects on the varieties, or yield differences between the varieties.

Table 1 reports forage yields for the four fababean varieties in 1989. The research plots were planted on April 6 with a seeding rate of 100 lbs/acre.

Table 1. Fababean Variety Forage Yields, SE Farm, 1989.

Aladin	Ackerperle	Herzfreya	Diana
- - - - - - Dry Matter, Ton/Acre * - - - - - -			
1.58	1.45	1.44	1.41

* NS

Dry matter yields were again hurt by the dry conditions that occurred during April, May, and June. Heat stress was not as big a factor in 1989 as it was last year. This years' plots were planted in 15 inch rows, because there was not a large advantage to planting in drilled rows last year when compared to the 15 inch rows. Differences between varieties in 1989 were quite small and not significant.

The yield of fababeans goes hand in hand with small grain and alfalfa yields. If conditions are not ideal for these two crops, fababeans will also have similar problems in obtaining maximum yields. The rain that was received in late June was too late to aid the fababean crop in final yields, because they were slowed beyond help by this time.

The larger area that was planted for forage to be used in livestock research had similar yields to the small plots of 1.5 tons of dry matter per acre. A second planting of fababeans, was again planted during the summer, to see if similar results to those of last year could be achieved. The second planting of fababeans did not fare as well in 1989 because rainfall received after planting was considerably less than 1988. August and September were both quite dry compared to last year. There was some growth, but only half of what was there in 1988. The drier conditions also made the fababeans more susceptible to frost when compared to 1988. The crop was more severely injured this year with a higher freezing temperature than in 1988. In 1988, the temperature required for killing was 20 degrees F. In 1989, 26 degrees F set the fababeans back, and they never did come out of it. This was quite different from 1988, because the fababeans continued to grow into November, whereas they quit growing in the later part of September in 1989. Therefore, no yields were taken from the summer planting because there was not enough material to justify a field operation to harvest.

S.E.FARM
REPORT

RESIDUAL EFFECTS OF P FERTILIZATION

D. R. Sorensen

Southeast Farm 89-7

Summary

Several states in the North Central Region have established long-term phosphorus studies. These experiments were designed to evaluate the residual effects of P fertilizer and also generate P soil test calibration data in a situation where a range of soil test calibration data exists in one soil. These data are extremely useful for evaluation of year-to-year fluctuations in crop response to soil test P and establishing response probabilities at one given soil test level. Valuable lessons can also be learned from such studies that relate to short-term and long-term P management decisions.

Methods: The long-term P study in South Dakota is located south of the office building on the Southeast Experiment Farm near Beresford. The soil is classified as an Egan silty clay loam (Udic haplustoll). These are deep, friable, well-drained soils developed in a silty cap over glacial till. From 1964 to 1967 five rates of P (0, 10, 20, 40, and 80 lbs P/A) were broadcast and plowed down annually to establish a range of soil test levels. Various crops have been grown in the study with the major ones being corn and alfalfa. Two years of soybeans and sorghum were included over the 23-year period. Since 1983 the study has been planted to corn and moldboard plowed or chiseled each fall. Table 1 reports management practices for the experiment in 1989.

Table 1. Management Practices for Residual Phosphorus Study, SE Farm, 1989.

Tillage	Fall chisel with sweeps
Past Crop	Corn
Hybrid	Pioneer 3732
Seeding Rate	21,300 seed/acre
Herbicide	Eradicane + Atrazine PPI
Planting Date	April 19
Insecticide	Dyfonate
Fertilizer	60 # Sidedress
Harvest Date	September 29

Results and Discussion: Corn grain yields and grain moisture were not influenced by soil test P level differences in 1989 (Table 2).

Table 2. Influence of Soil Test P Level on Corn Grain Moisture in 1989 and Grain Yield from 1983-1989.

Soil Test P Level	1983	1984	1985	1986	1987	1988	1989	Avg	1989
				Grain Yield					
lbs/A*	- - - -	- - - -	- -	bu/A @ 15%	- - - -	- - - -	- - - -	- -	%H2O
15(L)	102	103	119	113	108	26	84	94	12.7
20(M)	97	101	117	113	112	27	87	93	12.5
19(M)	103	102	126	111	107	23	88	94	13.3
28(H)	106	109	131	113	113	28	89	98	12.7
56(VH)	107	117	129	114	115	23	91	99	13.1

*Bray and Kurtz No. 1, Summer 1988, 0-4"

Corn yields from 1983 through 1989 show that the 28 and 56 lb/A level do average slightly higher yields when compared to the three lower soil test levels. The data shows that the response to P varied considerably across years with no response in 1983, 1986, 1987, 1988 and 1989, a small response in 1984 and a good response in 1985. This illustrates that P fertilization needs to be evaluated over a long-term period. Residual effects of the P fertilizer (in this case applied over 20 years ago) cause this input to act in part as a capital investment like tile installation. The cost of P fertilization should not be attributed to a single crop because benefits may be seen for several years.

S.E. FARM
REPORT

INFLUENCE OF POTASSIUM, SULFUR, ZINC AND LIME ON CORN

Jim Gerwing, Ron Gelderman,
Dale Sorensen

Plant Science 89-8

INTRODUCTION

Some farmers in South Dakota are using potassium, sulfur, zinc and lime on soils which have a high soil test for these nutrients. The SDSU soil testing lab would not predict an economical response when soil test levels are high. Soil testing lab comparison studies conducted each year for seven years at the SE Farm near Beresford and at Brookings have shown that applying a combination of these nutrients as a group was not giving an economical response on corn. Each individual nutrient alone, however, was not compared to a check plot. In 1987, a demonstration was implemented at the Southeast Farm near Beresford, South Dakota to show the effect of each of these commonly used nutrients on a high fertility soil. No corn yield increases due to the use of potassium, sulfur, zinc or lime were noted. In 1988, this demonstration was moved to another location at the farm where the treatments will be followed for several years in a corn-soybean rotation.

MATERIALS AND METHODS

The demonstration was established on the SE Farm on an Egan silty clay loam. Egan soils are well drained soils formed in silty drift over glacial till. Prior to establishing this demonstration in 1988, soils were sampled to a depth of 2 feet in 0-6, 6-12 and 12-24 inch increments. A complete analysis was done on all depths and reported in the Southeast Farm Progress Report 88-6 along with corn yields from 1988.

The corn stubble was chiseled in the fall of 1988. Soils were sampled in the spring of 1989 prior to the application of fertilizer treatments. Fertilizer treatments consisted of 50 lb. K_2O, 25 lb. sulfur and 5 lb. zinc (table 1). They were applied to the same plot receiving these treatments in 1988. The lime treatment was applied only in 1988. No nitrogen or phosphorus was applied in 1989. Fertilizer materials were incorporated with a field cultivator along with two pints of Prowl prior to planting soybeans. Pioneer 9271 soybeans were planted on May 11 at 130,000 seeds per acre. The 15 foot by 50 foot plots were cultivated twice and combine harvested. The experimental design was a randomized complete block with 4 replications.

Table 1. Fertilizer Treatments 1989 Potassium, Sulfur, Zinc and Lime Demonstration, SE Farm

Treat. No.	N[1]	P_2O_5[1]	K_2O	S	Zn	Lime
	lb/A					
1	-	-	0	0	0	0
2	-	-	0	0	0	0
3	-	-	50	0	0	0
4	-	-	0	25	0	0
5	-	-	0	0	5	0
6	-	-	0	0	0	4000

[1] no N or P application in 1989, 1988 N rates: treat. 1, 8 lb; treat. 2-6, 123 lb. N, all plots received 25 lb P_2O_5 in 1988

RESULTS AND DISCUSSION

Soil test levels from samples taken in the spring of 1989 are presented in Table 2. Potassium and sulfur soil tests were both very high and not affected by fertilizer applications made to corn in 1988. The zinc soil test was .85 ppm in the check plots but had been increased to 2.10 ppm from the application of 5 lbs. of zinc in 1988. The pH was 5.8 in the check but had been raised to 6.9 by the application of 4000 lbs. of lime ($CaCO_3$ equivalent) from the Sioux Falls water treatment plant.

Table 2. Soil test levels, Potassium, Sulfur, Zinc and Lime Demonstration, 1989, Beresford, SD

Treatment	NO_3-N	P	K	S	Zn	pH	Salt
	lb/A-2 ft.	--lb/A--		lb/A-6 in	PPM		mmho/cm
N-P Check[1]	148	46	640	42	0.85	5.8	.4
Treatment[1,2]	-	-	640	46	2.10	6.9	

[1] 123 lb. N and 25 lb. P_2O_5 applied in 1988
[2] 50 K_2O, 25 S, 5 Zn applied in 1988 and 1989, 4000 lime applied in 1988 only

Soybean grain yields and moisture are presented in Table 3. None of the fertilizer treatments had an effect on soybean yields. A yield response to potassium and sulfur was not expected due to high soil test levels. The zinc soil test of the check was 0.85 ppm. A recommendation by the SDSU soil testing lab for zinc is made for soybeans if the soil test is less than 1.0 ppm. The response to zinc in the medium soil test range (.5 to 1.0 ppm) is not certain, and in this situation it did not occur. The zinc treatment, however, did result in drier soybeans at harvest (Table 3).

The demonstration will be continued over the next several years to test for potential responses to these nutrients in different years. A corn-soybean rotation will be continued, therefore, corn will be planted next year.

Table 3. Soybean Yields and Grain Moisture, Potassium, Sulfur, Zinc and Lime Demonstration, 1989, Beresford, SD

Fertilizer Treatment lb/A	Grain Yield bu/A	Grain Moisture %
-[1]	26	9.0
-[2]	24	8.7
50 K_2O[2]	26	8.8
25 S[2]	26	8.7
5 Zn[2]	25	8.5
4000 lime[2,3]	27	8.6
LSD .05	NS	.26

1 no fertilizer applied, 1988 or 1989
2 123 lb. N, 25 lb. P_2O_5 applied 1988 only
3 lime applied 1988 only

S.E. FARM
REPORT

NITROGEN MANAGEMENT DEMONSTRATION

Jim Gerwing, Ron Gelderman,
Dale Sorensen

Plant Science 89-9

Introduction

There is increasing concern about the effects of nitrogen fertilizer on the environment, especially groundwater quality. This concern has been intensified by more numerous reports of NO_3-N concentrations above the legal drinking standard of 10 PPM in several locations in eastern South Dakota, especially where aquifers are shallow and soils very coarse. In some instances, nitrogen fertilizer moving below the root zone has been implicated.

This nitrogen management demonstration was established to show the effects of N rates and timing in a corn-soybean rotation on nitrogen movement below the root zone. In most situations in South Dakota, if nitrogen moves below the root zone it stays there and only rarely moves back up. Therefore, once out of reach of crop roots it has the potential to move down to the groundwater with percolating water during periods of high moisture.

Materials and Methods

The nitrogen management demonstration was established on the SE South Dakota Experiment Farm near Beresford. It is located on an Egan silty clay loam. Egan soils are well drained soils formed in silty drift over glacial till.

The demonstration was established in 1988. The rates and timing of fertilizer N applied to corn in 1988 are listed in Table 1. Corn yields and residual NO_3-N soil test levels were reported in the 1988 SE Farm Progress Report number 88-7.

The site was chiseled in the fall of 1988 and rotated to soybeans in 1989. No additional fertilizer was applied. Two pints of Prowl were incorporated prior to planting Pioneer 9271 soybeans at 130,000 plants per acre on May 11. Plots were cultivated twice and combine harvested. Soil samples for NO_3-N were taken to a depth of 2 feet on April 8 and to 4 feet on November 21 in the check plots and in plots receiving 123, 200, and 400 lb. N/A in the spring of 1988 prior to corn. The split and fall treatments were not sampled in 1989. A randomized complete block design was used with 4 replications. Plot size was 15 foot by 15 foot.

Table 1. Nitrogen Fertilizer Treatment 1988
Nitrogen Demonstration, SE Farm

Treat. No.	Time of Application Spring[1]	Split[2]	Fall
	-------------	lbN/A	-------------
1	8	---	---
2	123	---	---
3	30	93	---
4	123[3]	---	---[3]
5	200	---	---
6	400	---	---

1 prior to planting (May 2)
2 June 3
3 treatment will be applied in fall in future years

Results and Discussion

Nitrate soil test levels from the spring and fall samplings are presented in Table 2. Spring test levels showed a large nitrogen carryover from fertilizer applied in 1988. Over 375 lbs. of NO_3-N were found in the top 2 feet of soil where 400 lbs. N had been applied the previous year. The 200 and 123 lb. N rates had carryover levels of 195 and 163 lbs. respectively as compared to the check which had a 69 lb. test level. The high carryover levels were due to both the high N application rates and extreme drought which limited corn yields in 1988 to about 25 bushels per acre and therefore limited N removal.

Table 2. NO_3-N Soil Test Levels, Nitrogen Management Demonstration 1989, Beresford, SD

Depth	Fertilizer N Applied, Spring 1988 - lb/A: 8 Spring	8 Fall	123 Spring	123 Fall	200 Spring	200 Fall	400 Spring	400 Fall
inches	Soil NO_3-N, lb/A, 1989[1]							
0- 6	23	10	54	20	48	21	103	37
6-12	19	6	48	20	59	37	115	77
12-24	27	13	61	24	88	56	160	86
0-24	69	29	163	64	195	114	378	200
24-36		9		14		18		27
36-48		9		13		14		10

1 Sample dates: Spring, April 8; Fall, November 21, 1989

Soil samples taken in the fall show much lower NO_3-N levels than the spring sampling. That indicates the soybeans in 1989 removed large amounts of the nitrogen carried over from the previous year. The 378 lb. test level was reduced to 200 and the other treatments were reduced proportionately, including the check which went from a spring test of 69 lbs. to 29 lbs.

Soil samples taken below 2 feet to a depth of 4 feet show only small amounts of nitrate nitrogen. That indicates nitrogen movement below the root zone did not occur in 1988 and 1989 and provides evidence that the NO_3-N soil test reductions mentioned above were due to soybean uptake and not nitrogen movement deeper into the profile.

Soybean yields and grain moisture at harvest are presented in Table 3. Soybean yields were not significantly affected by the differing NO_3-N soil test levels at the beginning of the season although they tended to trend higher with higher NO_3-N soil test levels. Soybean grain moisture was higher in plots with higher residual spring NO_3-N soil test levels. Only the very high NO_3-N level significantly affected grain moisture, however, and levels which are normally found in fields (less than 200 lbs.) had no significant effect.

This demonstration will be continued over the next several years to monitor nitrogen movement in soils. A corn-soybean rotation will be continued, therefore, corn will be planted next year and nitrogen fertilizer will again be applied.

Table 3. Soybean Grain Yield and Moisture Content, Nitrogen Management Demonstration, 1989, Beresford, SD

N Rate[1]	Soybean Grain Yield	Moisture at harvest
lb/A	bu/A	%
8	25	8.9
123	24	8.5
200	28	9.2
400	29	9.7
LSD .05	NS	1.2

[1] applied spring 1988, prior to corn

S.E. FARM
REPORT

TILLAGE AND ROTATION FOR CORN AND SOYBEANS

D. H. Rickerl and D. R. Sorensen

Plant Science 89-10

Summary

This study was initiated in 1987 to determine tillage and crop rotation effects on yields and soil moisture. The tillage treatments were moldboard plow, chisel plow, and ridge-plant. Each tillage system included four crop sequences: continuous corn, continuous soybean, corn/soybean rotation and soybean/corn rotation. During the 1988 growing season, drought conditions limited yields of both corn and soybean, however, soybean roots continued to remove water from the soil profile to a later date than did corn. In the spring of 1989, the soil moisture levels were generally greater in the ridge-plant than the chisel or moldboard plow systems and were also slightly higher for soils producing corn in 1988 than for soils producing soybean. Grain yields in 1989 reflected these differences and were highest for the ridge-plant system and/or for crops following corn.

Methods: Crop rotations were begun in 1987 for continuous corn, continuous soybean, and rotated corn-soybean treatments. All crops were cultivated and ridged plots were established with the second cultivation. Fall tillage treatments included moldboard and chisel plow. Fertilizer and pesticide application followed recommended practices. Management practices are summarized in Table 1.

Table 1. Management practices for tillage and rotation study in 1989.

	Crop	
Practice	Corn	Soybean
Variety	Pioneer 3732	Corsoy 79
Plant Date	April 27	May 11
Herbicide	Lasso+Bladex Band	Lasso Band
Fertilizer	120 lb N/acre+	--
	90 lb N/acre	--
	25 P_2O_5 Pop-up	
Harvest Date	September 29	September 20

\+ Continuous corn received 30 more lb N/acre than corn in rotation with soybean.

Crop residues were measured in the fall of 1988 after tillage treatments and again in the spring of 1989 (Table 2). The percent of ground surface covered by residue ranged from 6 to 78%. All ridge-plant treatments maintained adequate ground cover to meet conservation requirements of 30%. Chisel plowing also met the 30% percent requirement if corn was included in the crop sequence.

Table 2. Crop residues in the fall of 1988 and spring of 1989 as affected by crop and tillage.

		Crop and Rotation			
		Corn 1989		Soybean 1989	
Season	Tillage	Corn '88	Soybean '88	Soybean '88	Corn '88
		- - - - - - - -% Cover - - - - - - - - - - - -			
Fall 1988	Moldboard	9	10	6	14
	Chisel	35	28	16	35
	Ridge	78	60	52	60
Spring 1989	Moldboard	10	9	10	6
	Chisel	40	30	16	36
	Ridge	65	62	49	40

Both crop residue and tillage influenced snow catch during the 1988-89 winter (Table 3). Ridged corn averaged 8 inches of snow cover compared to an average of 2 inches in plowed soybean. Soybean residue caught less snow than corn residue in both ridged and chiseled plots.

Table 3. Average snow depth during the 1988-89 winter, as affected by crop and tillage.

	Crop and Rotation			
	Corn 1989		Soybean 1989	
Tillage	Corn '88	Soybean '88	Soybean '88	Corn '88
	- - - - - - - - - - inches - - - - - - - - - -			
Moldboard	2	2	2	3
Chisel	5	4	4	7
Ridge	8	3	2	7

Soil moisture was measured in six inch increments prior to planting in the spring of 1989 (Table 4). The total amount of moisture in the profile represented differences due to tillage, snow catch, and crop removal during the previous season. Ridge-plant systems, which caught more snow, tended to have more water in the profile than the chisel or moldboard plow systems. Drought conditions limited crop growth in 1988. Soybean, which are indeterminate in growth habit, continued to remove soil water to a later date than did determinate corn plants. The 1989 spring soil moisture levels, therefore, were slightly higher in corn (1988) than soybean producing soils.

Table 4. Soil moisture in 6 inch increments in the spring of 1989 as influenced by crop rotation and tillage.

		Crop and Rotation			
	Depth	Corn 1989		Soybean 1989	
Tillage	(in)	Corn '88	Soybean '88	Corn '88	Soybean '88
		- - - - - - - -inches moisture- - - - - - - -			
Moldboard	0-6	1.3	1.3	1.4	1.3
	6-12	1.4	1.4	1.4	1.4
	12-18	1.4	1.3	1.3	1.4
	18-24	1.1	1.1	1.0	1.1
	24-30	0.8	0.8	0.8	1.0
	30-36	0.8	0.7	0.8	0.8
	36-42	0.9	0.8	0.8	0.8
	Total	7.7	7.4	7.5	7.8
Chisel	0-6	1.3	1.4	1.3	1.4
	6-12	1.4	1.4	1.4	1.4
	12-18	1.4	1.3	1.4	1.4
	18-24	1.3	1.0	1.0	1.1
	24-30	1.0	0.7	0.8	0.9
	30-36	0.9	0.7	0.8	0.8
	36-42	0.9	0.7	0.9	0.8
	Total	8.2	7.2	7.6	7.8
Ridge	0-6	1.5	1.4	1.4	1.4
	6-12	1.6	1.5	1.5	1.5
	12-18	1.4	1.3	1.3	1.4
	18-24	1.3	1.1	1.0	1.2
	24-30	1.0	0.7	0.8	0.9
	30-36	0.8	0.8	0.7	0.8
	36-42	0.9	0.9	0.8	0.9
	Total	8.5	7.7	7.5	8.1

The slight differences in soil moisture may have contributed to 1989 yield differences (Table 5). Corn grain yields ranged from 97 bu/acre in continuous, ridge-plant treatments to 73 in rotated moldboard plow treatments. Corn yields ranked by tillage were ridge-plant greater than chisel plow greater than moldboard plow. Continuous corn outyielded rotated corn regardless of tillage system. Soybean yields, however, were improved when rotated with corn. Rotated soybeans averaged 30 compared to 22 bu/acre for continuous soybeans. Tillage had little influence on soybean yields.

Table 5. Corn and soybean yields in 1989 as affected by crop rotation and tillage.

Tillage	Crop and Rotation			
	Corn 1989		Soybean 1989	
	Corn '88	Soybean '88	Soybean '88	Corn '88
	bu/acre			
Moldboard	84	73	23	30
Chisel	87	77	21	31
Ridge	97	80	21	28

S.E.FARM REPORT

EFFECTS OF TILLAGE AND N RATE ON SOIL NO_3N LEVELS AND CORN GRAIN YIELD

W.B. Gordon and D.H. Rickerl

Plant Science 89-11

Introduction

The use of chemicals in agriculture is recognized as a potential source of environmental pollution, specifically with respect to water quality. Nitrate- nitrogen (NO_3-N) is one area that is currently receiving considerable attention. Groundwater pollution is of increasing concern in the United States because about 50% of our drinking water comes from well water. In South Dakota, NO_3-N pollution of drinking water supplies is being reported more and more frequently.

Conservation tillage systems are gaining acceptance as alternatives to moldboard plowing. Changes in tillage practices can directly affect soil water properties and the leaching characteristics of soils. Because of the concern for NO_3-N pollution and the increasing use of conservation tillage practices, a test was initiated in 1987 to investigate tillage effects on NO_3-N leaching and to determine if N requirement for maximum yield differs with tillage system.

Methods: The experimental site was located at the S.E. South Dakota Experiment Farm near Beresford on an Egan silty clay loam soil. Average organic matter content was 3.2% and initial soil pH was 6.8. Soil test P and K were 25 and 520 lbs/A respectively.

The test consisted of three tillage systems (moldboard plow, chisel, and ridge-tillage) and five nitrogen rates (0, 60, 120, 180, and 240 lbs of N per acre). The moldboard plow and chisel treatments were done in the spring in 1987 and in the fall after harvest in 1987 and 1988. The ridges were built by cultivation in June 1987. The plots were side dressed with urea 3 weeks after planting. The fertilizer was immediately incorporated by cultivation. Corn was planted on 24 April 1987, 11 May 1988 and 4 May, 1989. The corn hybrid Pioneer 3732 was planted each year. Plant populations averaged 24,000 plants/acre.

Soil NO_3-N samples were taken 2 weeks after planting, but before side dressing, 10 days after side dressing, at mid-silk and again after harvest. The samples were taken to a depth of 36" in the following increments: 0-6", 6-12", 12-24", and 24-36".

Results: Table 1 shows the changes in soil NO_3-N content from fall 1987 to spring 1989. Soil NO_3-N increased with increasing nitrogen rate at all sample dates. The changes in NO_3-N content in the 0-N check plot from fall to spring represent the amount of N that was mineralized during this period. If this amount of newly mineralized N is added to the fall NO_3-N contents it can be seen that most of the NO_3-N was accounted for in the spring sampling. This indicated that very little NO_3-N was lost from the corn rooting zone. Tillage did not affect NO_3-N downward movement in this 3 year study.

Corn grain yields in 1989 were affected by N-rate and a tillage N-rate interaction (Table 2). The ridge system produced a significantly greater amount of grain at the 180 lb/A N rate than did the chisel and moldboard systems.

The relationships between corn grain yield in 1989 and NO_3-N in the top 24" of the soil profile are given in Table 3. The r^2 values indicate that the NO_3-N content taken in the fall or the spring explain a large amount of the variations in grain yield. Taking NO_3-N samples to a depth of 36" did not improve the correlations.

Table 1. Soil NO_3-N (0-36") at 4 sample dates as affected by applied nitrogen.

N-Rate	Date 10/87	6/88	10/88	6/89
		NO_3-N		
lb/A	- - - - - - - -	lbs/A	- - - - - - - -	
0	18	55	20	80
60	25	65	40	109
120	30	70	75	135
180	40	87	105	180
240	50	95	145	215
FLSD(.05)	10	12	15	25

Table 2. Corn grain yield, 1989 as affected by tillage and N-rate.

N-Rate lbs/A	Chisel	Tillage Moldboard	Ridge
	- - - - - - - -	bu/A - - - - - - - - -	
0	75	80	68
60	95	92	95
120	102	98	105
180	103	100	114
240	110	103	114

FLSD(.05) = 8.0

Table 3. Relationship between soil NO_3-N contents (0-24") at two samp dates and 1989 corn grain yield.

	Tillage	Equation	R^2
Fall 1988			
	Chisel	$79.11 + .45\ X - .002X^2$	.52
	Moldboard	$70.88 + .55\ X - .002X^2$	.55
	Ridge	$77.11 + .59\ X - .002X^2$	.55
Spring 1989			
	Chisel	$51.51 + .81\ X - .003X^2$	.55
	Moldboard	$76.71 + .12\ X$	.55
	Ridge	$70.36 + .27\ X$	.60

TILLAGE AND LANDSCAPE POSITION EFFECTS ON CORN AND SOYBEAN YIELD

T.E. Schumacher, and D. Sorensen

S.E. FARM REPORT

Plant Science 89-12

Tillage systems which leave a high residue cover on the surface generally perform as well as, or better than other systems with little or no residue cover. This is especially the case on soils which are well suited to crop production. However, there has been some hesitation about using conservation tillage systems in areas where soil temperatures remain cool and soil moisture levels are relatively high during the early part of the growing season. Due to the rolling topography of Eastern South Dakota, well drained and less well drained soils occur in an intricate pattern across most fields. This study is designed to provide information on the benefits and difficulties associated with selected tillage systems on soils which have different moisture and temperature environments, (well drained vs. less well drained). The study also provides information for evaluating a method for selecting corn hybrids which are more tolerant of stress environments. The line source irrigation selection method for evaluating corn hybrids was conducted at a separate location.

Methods. The two soils in the study are an Egan soil located east of the farm feedlot, and a Wentworth soil located in the lower landscape position in the southeast part of the farm. The Egan soil is formed in silty glacial drift and has a silty clay loam surface texture. The Wentworth soil is similar to the Egan soil, however, it is typically found in lower positions in the landscape and has deeper silty horizons. Tillage systems include ridge till (RT), no till (NT), and a fall moldboard plow - disk (MP) system. A starter phosphorous fertilizer was applied to half of each tillage plot at a rate of 25 lbs P_2O_5 / acre. Yield was determined by machine harvesting the center rows of each treatment. There were four replications of each treatment. The cultural practices are outlined in Table 1. Soil test results were used to determine application rates of fertilizer. Test results are given in Table 2 for the two soils.

Table 1. Cultural practices for 1989.

Practice	Corn
Variety	Pioneer 3475
Planting Date	May 2, 1989
Row Spacing	30 in.
Planting Rate	22,900 s/a
Herbicide	Dual + Atrazine Pre
Insecticide	Counter
Harvest Date	October 6

Table 2. Soil Test Results, Spring 1989.

	NO3-N	P	K	Soil
	lb/A			
0-6"	56	38	608	Egan
6-24"	101			
0-6"	46	18	615	Wentworth
6-24"	135			

Six corn hybrids were also included in each tillage plot and phosphorous starter subplot for both soils.

Results and Discussion: Yield data for the Egan and Wentworth soils are given in Tables 3 and 4. There was no effect of tillage system on yield on the Egan soil for both rotations. There was an effect of tillage system on yield on the Wentworth soil for both corn and soybeans. The no till and ridge till systems yielded approximately 9% higher than the moldboard plow system. This was likely due to moisture conservation benefits of the ridge and no till systems.

No phosphorous starter effects were observed on any of the soils or tillage treatments this year. This may have been a result of water stress early in the season reducing the benefits of starter applied phosphorous.

Table 3. Continuous Corn Yields.

	Soil	
Tillage	Egan	Wentworth
	Bu/A	
RT	96	91
NT	93	88
MP	96	82
P(F)	NS	0.11

Table 4. Soybean Yields.

Tillage	Soil: Egan	Soil: Wentworth
	Bu/A	
RT	37	39
NT	39	37
MP	34	35
AVE	NS	0.03

Yield data for the hybrids which are being used to evaluate stress selection methods are given in Table 5 & 6. A tillage and hybrid interaction was observed on the Egan soil. Generally the conservation tillage systems yielded better than the moldboard plow - disk treatment. The effect was more noticeable on some hybrids than others. The Wentworth soil did not result in a significant tillage or hybrid x tillage interaction. This indicates that the tillage systems in the hybrid study on the Wentworth soil tended to have similar yields. The reverse was found on the main study where tillage had an effect on the Wentworth soil but not on the Egan soil. One reason for the difference may be the difference in maturity ratings between the hybrid used in the main study and those used in the hybrid study. An earlier maturing group of hybrids were a part of the line source study (95 day maturity) and these hybrids were selected because of their unique responses to water stress.

Table 5. Corn yield on the Egan soil for the Hybrid Yield Stability Study.

Tillage	RT	NT	MP
		Bu/A	
FR23xA632	67	71	57
FR23xCM105	59	65	52
LH38xA632	81	66	78
LH38xCM105	69	64	55
W64AxA632	65	97	63
W64AxCM105	61	47	47
AVE	67	67	58

HxT $LSD_{.10}$ = 13 bu/a

Table 6. Corn yield on the Wentworth soil for the Hybrid Yield Stability Study.

Tillage	RT	NT	MP
		Bu/A	
FR23xA632	62	60	63
FR23xCM105	56	50	55
LH38xA632	79	75	71
LH38xCM105	54	55	56
W64AxA632	56	69	58
W64AxCM105	43	49	39
AVE	58	60	58

The results over all studies indicated that no-till and ridge-till systems in many instances outperformed the moldboard plow - disk system. This is different than the first couple years of the study and indicates that the benefits from no-till and ridge-till become more apparent with time. One would also expect benefits from no-till and ridge-till in a dry year. Moisture conservation benefits result from increased residue cover and water infiltration rates associated with high residue tillage systems. The increase in infiltration rates are likely to be due to gradual changes in soil structure under the reduced tillage systems.

S.E.FARM
REPORT

DEVELOPMENT OF AN INTEGRATED P MANAGEMENT RECOMMENDATION SYSTEM

T.E. Schumacher, B.G. Farber, P.E. Fixen,
H. Ybanez, and D. Sorensen

Plant Science 89-13

Introduction

A field study was started in the fall of 1988 to provide information on the efficiency of phosphorus banding for corn and soybeans. The study is designed to determine the feasibility of using a computer model to help make P recommendations in South Dakota. The analytical instrumentation used in soil test laboratories are much more sophisticated today than in the past. New and more precise instrumentation however does not automatically translate into more accurate fertilizer recommendations. For example the collection of representative soil samples from the field is still very critical. Additionally, soil test results from the laboratory must be interpreted and recommendations made to reflect actual field conditions. The methods of making recommendations are still rather crude and can result in overgeneralization. This is especially true for P.

Most soil tests for P are based on only one indicator of the ability of the soil to supply P. We know that at least three parameters must be known to accurately define the P supplying ability of a soil. If we know the soil moisture content, these three values can be calculated from the soil test level if the basic relationships of these values have been previously determined for a soil. Currently recommendations are made from the soil test level only, and result in an accuracy which may have worked for past agricultural practices. The agricultural practices of the future and present require recommendations which result in efficient use of our resources. This means we need to avoid both over-fertilization and under-fertilization. The former leads to profit loss and potential eutrophication of surface waters, while the latter can also result in loss of profits and inefficient use of soil nitrogen which can result in increased soil nitrate with potentially damaging effects on groundwater quality.

Current P recommendations are unable to predict accurately the effects of weather, tillage systems, placement, soil structure and texture on the P requirements of crops. A computer based model which simulates the physical and chemical processes occurring in the field would have those capabilities. Preliminary indications are that the Cushman-Barber model provides the basis for achieving this result. We are planning to use data from this experiment to test the ability of this model to predict P placement and rate effects on the P uptake of corn and soybean. Specific objectives for the study are:

1. Determine if the efficiency of P banding for corn and soybean can be improved by controlling the volume of soil fertilized. (The model suggests that this may occur.)

2. Compare spoke injection of P to continuous bands.

3. Determine if uptake is influenced by dilution of fluid fertilizer with water.

4. Compare the rate and placement predictions resulting from application of the Cushman/Barber model to measured response in field experiments.

Treatments

The study is being conducted three miles north and two west of the SE Experiment Station Farm on an Egan soil. A ridge-till system and corn-soybean rotation are being used for all treatments. The field is divided into two halves with corn and soybeans alternating between the two halves each year. There are four replications for each treatment. The source of P is 10-34-0 and also a dilution treatment in which the 10-34-0 is diluted 4:1 (3 parts water to 1 part fertilizer). P205 rates are at 20, 40 and 80 lbs/acre and a 0 check treatment. The placement treatments consist of bands applied with a specialized knife applicator built by Brad Farber. The majority of treatments are applied in the fall because of time constraints in the spring. A summary of the treatments are given below: (an x means that the treatment is present in both corn and soybeans and has four replications.)

Source	P205 Rate	Spoke	Placement Bands/Row 1	2	4	Broadcast
	lbs/a					
10-34-0	20	x	x	x	x	x
	40	x	x	x	x	x
	80	x	x	x	x	x
	0		x			
Spring applied 10-34-0	20		x			
	40		x			
4:1 dilution	20	x	x	x	x	
	40	x	x	x	x	
	80	x	x	x	x	

Measurements are being made of P uptake throughout the season, root growth during the season (P uptake is especially sensitive to root length), soil supplying parameters, yield and associated agronomic traits. Detailed root and plant measurements are being made on selected treatments because of the time consuming nature of the measurements. A string was applied with the band on the single knife treatment in the corn plots to allow us to identify the exact location of the fertilizer band. This aids in determining the possible effects of the band on root growth and P uptake.

Results

Since this is the first year of the study no conclusions can be made concerning the treatment or the model. Because of the extensive nature of the collected samples (root samples, etc.) many of the samples will be processed throughout the winter. Model evaluation with the 1989 data will not be possible until sometime in 1990. No significant differences were observed in yield in 1989 due to treatments. This is likely a result of the very dry soil moisture conditions which occurred early in the season. P is very important in the early development of corn and moisture may have been the limiting factor at that time. A heavy rainfall at the time of silking greatly increased the yield potential late in the season. Corn yields averaged 120 bushels per acre over all plots.

S.E.FARM
REPORT

1989 PERFORMANCE TRIALS OF SMALL GRAIN, GRAIN SORGHUM, SOYBEANS AND CORN AT THE SOUTHEAST RESEARCH FARM

J. J. Bonnemann

Southeast Farm 89-14

Four major crops were included in the crop performance testing program at the Southeast Farm in 1989. Data from all trials and other areas of the state are found in publications for each crop type. All row-crop proprietary entries are the choice of the participating company and are included on a fee basis.

Trials of oats and spring wheat were conducted on the farm in 1989. Tables 1 and 2. Additional results of the trial are found in EC 774, 1990 Variety Recommendations, Small Grain.

The 1989 Grain Sorghum performance results for the Southeast Farm are reported in Table 3. Yield results and other data for all trials can be found in Plant Science Pamphlet #21, 1989 Grain Sorghum Performance Trials.

Soybean trials were conducted at several locations in southeast South Dakota including the Southeast Farm. Data included in Tables 4 and 5 are from only the 92 entries included at Centerville. Results for the other trial sites and all South Dakota trials can be found in EC 775(rev.), 1990 Variety Recommendations, Soybeans.

Over 110 corn hybrids were compared in the performance trials located on the Southeast Farm in 1989. Yields ranged from 125 down to 70 bu/a in the trials, Tables 6 and 7. Yields were quite good considering the 1989 weather conditions. Yields of all corn performance trials in 1989 and 2, 3, and 4-year averages can be found in Plant Science Pamphlet #20, 1989 Corn Performance Trials.

More information on these crops can be found by listing the publication as underlined, and sending to: Bulletin Room, SDSU, Brookings, SD 57007. These publications should also be available at your local county extension office.

Table 1. 1989 Oat Trials, SE Farm, Beresford, SD

Variety Name	Relative Maturity (days)	Yield	Test Weight	Plant Height
Horicon	4	61.2	31.94	27.5
Valley	8	58.3	35.67	25.0
Porter	9	52.4	33.21	25.5
Settler	5	51.9	34.69	26.5
Trucker	5	50.1	35.67	28.5
Wright	6	49.0	31.80	29.5
Sandy	7	48.9	33.56	29.0
Don	3	48.2	35.39	26.0
Proat	6	48.0	29.96	26.0
Lyon	6	47.9	31.44	30.0
Ogle	3	45.7	31.51	25.5
Moore	7	45.2	32.08	28.0
Hazel	2	44.8	33.42	24.0
Steele	7	42.2	29.33	27.0
Lancer	3	40.2	33.77	26.5
Hytest	3	39.7	38.77	28.0
Hamilton	1	38.6	30.46	22.0
Burnett	3	38.1	35.95	26.0
Webster	0	37.6	31.72	23.5
Preston	0	34.9	34.76	26.5
Kelly	0	29.3	35.95	27.0
Starter	1	25.2	35.95	26.0
Overall Mean		45.4	33.32	26.7
	LSD (.05) =	11.1 bu/a	CV-15.1%	

Table 2. 1989 Spring Wheat Trials, SE Farm, Beresford, SD

Variety Name	Relative Maturity (Days)	Yield	Variety Means Test Weight	Plant Height	Protein Percent
W2501	4	30.0	56.1	25.0	15.8
Stoa	3	29.8	57.8	25.5	16.4
W2502	4	28.2	56.8	21.5	16.3
Nordic	4	27.4	57.8	23.5	15.8
Gus	3	27.3	57.5	21.5	16.9
Angus	3	27.2	59.0	24.5	16.2
Telemark	3	27.1	57.7	22.0	17.1
Marshall	6	27.0	58.3	22.5	16.7
Butte 86	0	26.8	59.1	27.5	17.1
Celtic	4	26.6	58.2	25.0	16.8
Amidon	2	26.5	55.6	25.5	17.0
Vance	4	26.3	56.8	21.5	16.6
2375	0	26.2	58.7	24.5	16.8
2369	3	26.2	59.0	23.5	17.2
Norseman	4	26.1	57.6	21.5	17.1
Len	3	26.0	58.7	22.0	17.5
Shield	-2	26.0	57.2	24.0	16.3
Fjeld	1	25.3	57.7	23.0	16.4
Guard	1	25.1	59.1	22.5	16.6
Alex	4	24.8	58.3	23.0	17.6
Chris (Check)	3	24.3	56.5	27.5	17.2
(Minnpro)	3	24.2	55.8	23.5	17.7
Grandin	1	23.9	57.1	24.5	17.7
Prospect	2	22.7	59.1	24.0	16.5
Overall Mean		25.6	57.8	24.18	16.9
	LSD (.05) =	3.2		CV - 8.9	

Table 3. Grain Sorghum Trial, CPT, Southeast Research Farm, Beresford, SD

Variety Name	CWT Yield	Variety Means Test Weight	Plant Height	Moisture Percent	Headed Mo/Da
Warner WX89018	67.9	61.19	44.00	32.10	7/30
Dahlgren DG-33B	66.4	59.22	42.67	25.70	7/25
Warner WX88103	62.0	59.92	37.67	19.00	7/23
Warner WX89030	59.0	60.49	36.67	23.70	7.29
Dahlgren DG-2788	57.1	57.18	43.00	27.70	7/21
Warner W-545T	53.6	59.85	37.00	25.60	7/22
Overall Mean	61.0	59.64	40.17	25.63	7/25
LSD (.05) =	N. S.		CV - 8.6%		

Table 4. 1989 Soybean Performance Trial, CPT, Group I, SE Farm.

Variety Name	Group	Yield bu/A	Plant Height inches	Mature Mo/day
Sigco 94	I	47.6	30.67	9/13
Weber	I	45.0	33.33	9/12
Prairie Brand PB192	I	44.5	32.33	9/13
Hodgson 78	I	44.0	33.67	9/10
Sibley (CK)	I	43.9	32.00	9/ 8
Mustang M-1140	I	43.8	33.33	9/12
Agripro AP1989	I	43.5	32.67	9/11
Sturdy (CK)	II	42.4	34.00	9/16
Corsoy 79 (CK)	II	41.5	36.33	9/15
BSR 101	I	41.1	34.67	9/15
Riverside 1405	I	40.7	36.00	9/13
Hardin	I	40.6	33.33	9/10
Sands SOI 166	I	40.4	32.33	9/ 8
Kato	I	40.2	32.67	9/ 8
Mustang M-1150	I	40.1	30.00	9/ 8
Star EX821	I	39.5	30.00	9/ 8
Agripro AP1776	I	39.2	29.33	9/ 6
Dawson (CK)	0	38.9	28.67	9/ 3
Sands SOI 198	I	38.8	32.00	9/10
Fontanelle 3850	I	38.8	31.33	9/12
Merschman Venus	I	38.8	29.67	9/ 9
Glenwood (CK)	0	36.6	27.00	9/ 6
	Overall Mean	41.0	32.04	9/10
	LSD.05 =	5.2 bu/A	CV=7.8%	

Table 5. 1989 Soybean Performance Trial, CPT, Group II, SE Farm.

Variety Name	Group	Yield bu/A	Plant Height Inches	Mature Mo/Day
Golden Harvest H1233	II	50.8	35.67	9/18
Prairie Brand PB272	II	50.1	34.33	9/18
Kenwood	II	49.1	34.67	9/17
Hoegemeyer 237	II	48.7	34.00	9/18
Prairie Brand PB223	II	48.5	34.33	9/17
Profiseed PS1350	II	48.1	34.67	9/18
Schwitters Pawnee	II	47.7	34.33	9/17
Diamond D210	II	47.6	34.00	9/18
Northrup King S23-03	II	47.4	35.67	9/16
Schwitters Mohawk	II	47.1	38.33	9/18
Mustang M-1210	II	46.8	34.33	9/16
Sansgaard EXP 2062	II	46.8	33.67	9/16
S-Brand S-44D	II	46.5	33.00	9/17
Pioneer 9251	II	46.2	37.33	9/17
Sands SDI 277	II	46.1	34.33	9/17
Diamond D2258 (BL)	II	45.8	35.00	9/19
S-Brand S240	II	45.8	32.00	9/18
Northrup King S27-10	II	45.6	34.00	9/17
Elgin	II	45.6	32.33	9/17
Sansgaard S-2415T (BL)	II	45.3	33.00	9/17
Sexauer SX 2090	II	45.3	40.33	9/20
Agripro AP2021	II	45.3	33.67	9/14
Mustang M-1225	II	45.2	33.00	9/16
Hoegemeyer 282	II	45.2	33.33	9/19
Latham L-671 (BL)	II	44.8	33.00	9/17
Stine 2750	II	44.8	33.33	9/18
S-Brand 8240 (BL)	II	44.7	33.67	9/20
Stine 2330	II	44.7	34.00	9/18
Sands SDI 287	II	44.7	33.67	9/18
Merschman Munsee II	II	44.7	34.00	9/17
Dekalb CX226	II	44.6	30.33	9/17
Prairie Brand PB275(BL)	II	44.6	33.33	9/17
Latham L-770	II	43.8	34.00	9/18
Dekalb CX 264	II	43.8	32.33	9/16
Latham L-650	II	43.7	33.33	9/18
Sexauer SX 2080	II	43.6	32.67	9/16
McCurdy 2608 (BL)	II	43.6	34.67	9/17
Golden Harvest H1285	II	43.6	32.00	9/19
Dahlgren DG-3285	II	43.5	36.00	9/19
Century 84	II	43.0	35.00	9/19
McCurdy 279	II	42.7	33.00	9/19
Diamond TC204A	II	42.5	34.00	9/20
Star EX8829	II	42.3	33.00	9/19

Table 5. 1989 Soybean Performance Trial, Group II Continued

Variety Name	Group	Yield bu/A	Plant Height Inches	Mature Mo/Day
Miami	II	42.1	35.33	9/15
Preston	II	42.1	31.00	9/17
Burlison	II	42.1	33.33	9/20
Profiseed PS1152	II	42.0	32.67	9/16
Elgin 87 (CK)	II	41.7	30.67	9/18
BSR 201	II	41.7	33.33	9/19
Zane (CK)	III	41.6	34.00	9/24
Agripro AP2324	II	41.6	30.67	9/17
Corsoy 79 (CK)	II	41.3	37.00	9/14
Hy-Vigor 905-A	II	41.2	32.33	9/19
Hack	II	40.8	33.67	9/18
Fontanelle 3914	II	40.6	29.00	9/19
Agripro AP2292	II	40.6	31.33	9/16
Mustang EXP-13	II	40.3	33.00	9/16
Sturdy (CK)	II	40.2	33.67	9/14
Fontanelle 4201	II	40.0	35.00	9/16
Hoyt (S-D)	II	40.0	21.00	9/16
Dahlgren DG-3220	II	39.4	32.00	9/16
Hy-Vigor EX 2900	II	38.5	31.67	9/16
Golden Harvest H1240	II	38.0	31.00	9/15
Amcor 89	II	37.9	39.33	9/19
Wells II	II	37.8	35.00	9/15
Pioneer 9202	II	37.7	30.00	9/14
Sansgaard EXP 8951	II	37.6	32.00	9/18
Sibley (CK)	I	36.0	32.00	9/10
Star EX8929	II	33.0	28.33	9/18
Northrup King 8236	II	29.1	32.33	9/17
	Overall Mean	43.1	33.53	9/17

LSD .05 = 7.0 bu/a

Table 6. 1989 Corn Performance Trial, Area E(early), Beresford, SD

Brand and Variety	Type And Cross	Yield B/A	Avg. Test Weight	Pct. Stalk Lodged	Avg. Plants /Acre	Pct. Moist.	Perf. Score Rating
Betagold 853	M 2X	114.2	61.8	0.0	21780	17.8	2
Fontanelle 4035	E 2X	113.4	62.8	2.6	21780	15.4	1
Kaltenburg K6900	M 2X	109.8	62.7	3.0	22003	15.8	3
Tecnagene DF6905	M 2X	109.4	62.9	1.5	21780	16.0	4
Sigco 1814	L 2X	108.9	61.5	2.7	20775	17.4	5
Supercrost EXP8110	M 2X	106.6	62.0	5.8	21221	17.1	6
Hoegemeyer SX2628	M 2X	105.4	62.6	5.2	21668	17.5	7
DeKalb DK584	M 2X	103.4	62.4	5.2	21445	16.3	11
Golden Harvest X654	M 2X	103.3	61.3	5.2	21445	16.2	12
Curry 1446	M 2X	102.7	63.6	2.6	21780	15.2	9
Northrup King S4590	M 2X	102.4	63.6	2.1	20886	15.6	10
Golden Harvest H2327	M 2X	101.8	62.3	2.1	21668	14.2	8
Betagold Maria	M 2X	101.8	63.6	7.3	21445	16.5	14
Agripro AP525	M 2X	100.3	62.9	5.2	21333	16.6	16
Tecnagene DF6802	M 2X	100.3	64.0	0.5	21780	15.3	13
Hawkeye SX32	M 2X	99.2	61.9	3.2	20998	16.9	19
Hawkeye SX43	M 2X	99.1	61.8	3.6	21557	17.1	20
Betagold Katrina	M 2X	98.8	62.5	2.1	21557	15.1	15
Kaltenburg K5400	M 2X	98.3	63.5	3.2	20663	14.8	17
Golden Harvest H2404	M 2X	98.3	63.9	1.0	21780	15.8	18
Curry 1464	M 2X	97.7	64.8	0.5	20998	16.5	21
Dahlgren DC-527	M 2X	96.8	64.3	1.5	21668	15.4	22
Kaltenburg K6205	M 2X	96.5	64.0	7.8	21557	16.4	29
Supercrost 4366	M 2X	96.2	61.8	2.1	21110	16.9	27
Agripro AP424	M 2X	96.1	63.9	3.6	21557	14.2	23
Interstate IS729	L 2X	95.8	65.6	0.5	21892	16.6	26
Terra TR164E	M 2X	95.6	63.9	1.5	21780	14.7	24
Pioneer 3578	M 2X	95.1	63.3	1.0	22003	15.1	25
Northrup-King S5750	M 2X	94.9	63.6	7.8	21445	14.7	30
Top Farm SX1105	M 2X	93.9	64.8	1.6	21557	16.4	33
Northrup-King N4545	M 2X	93.6	62.4	1.0	21892	14.6	28
Top Farm SX1103	M 2X	93.3	63.1	1.1	21221	15.6	32
Betagold Hanna	M 2X	92.6	64.2	1.0	21668	15.4	34
Dekalb DK535	M 2X	92.3	57.2	4.2	19881	14.5	35
Pioneer 3615	M 2X	92.2	63.3	0.5	21333	13.9	31
Interstate IS543	M 2X	91.6	63.6	0.5	22115	15.6	36
Hoegemeyer SX2617	M 2X	91.6	63.9	2.6	21780	14.8	37
Crow's 210	M 2X	91.5	62.5	5.1	21780	15.1	40
Asgrow/O'Gold RX578	L 2X	91.5	64.0	4.1	22003	15.2	39
Wilson 1400	M 2X	90.6	63.6	0.5	21221	15.4	38
4-Star 5613	M 2X	88.7	62.1	4.1	21780	15.5	41
Cenex/LOL 451	M 2X	87.4	63.0	2.5	22115	15.7	44
Fontanelle 4030	E 2X	87.3	62.3	0.5	21780	15.5	42
Crow's 442	M 2X	87.0	62.5	5.6	22115	14.4	45

Table 6. 1989 Corn Performance-Early, Continued

Brand and Variety	Type and Cross	Yield B/A	Avg. Test Weight	Pct. Stalk Lodged	Avg. Plants /Acre	Pct. Moist.	Perf. Score Rating
Payco SX872	M 2X	86.9	63.7	5.6	22003	15.8	46
Hyperformer HS-45	E 2X	86.7	63.0	2.6	21780	14.6	43
Hyperformer HS-35	E 2X	85.8	62.7	8.2	21892	14.8	48
Sigco 1701	M 2X	85.2	64.5	2.6	21445	15.4	47
Terra TR 1040	M 2X	84.8	63.0	3.6	22003	16.6	51
Tecnagene DF6805	M 2X	83.5	63.7	2.1	21668	15.3	50
Pioneer 3475	M 2X	83.4	64.1	4.1	21780	14.9	52
Pfister 1575	M 2X	82.8	63.0	0.5	21668	15.0	49
Terra TR 975	M 2X	82.4	63.1	2.6	21780	15.9	53
Payco 648	M 2X	82.1	63.3	3.2	20775	15.4	54
Garst N6710	M 2X	82.0	61.2	6.0	20551	15.1	55
Asgrow/O'Gold RX626	L 2X	81.4	62.7	4.6	21892	15.1	56
Betagold Karla	M 2X	81.2	64.5	6.6	22115	14.8	57
Hyperformer HS-49	M 2X	78.9	62.3	4.6	21780	18.3	59
Hyperformer HS-25	E 2X	78.5	66.0	2.5	22115	14.3	58
Conti 8680	M 2X	75.5	64.2	3.8	17871	14.4	60
Interstate IS613	L 2X	71.3	63.3	4.6	22003	16.0	61
Means		93.4	63.1	3.2	21520	15.6	
	LSD .05	18.3			CV-12.1 %		

Table 7. Corn Performance Trial, Area E(late), Beresford, SD

Brand and Variety	Type and Cross	Yield B/A	Avg. Test Weight	Pct. Stalk Lodged	Avg. Plants /acre	Pct. Moist.	Perf. Score Rating
Garst 8532	L 2X	126.0	59.6	0.0	22115	19.4	2
Dekalb DK612	L 2X	125.4	61.8	2.0	22003	17.7	1
Pioneer 3362	L 2X	121.0	63.2	4.5	22115	16.5	3
Seedtec 7529	M 2X	120.6	61.1	1.0	22115	17.7	4
Terra TR1120	L 2X	119.5	59.1	3.1	21780	20.6	7
4-Star 5744	L 2X	117.4	60.6	1.0	21892	17.7	6
Kaltenberg K7400	L 2X	116.0	57.8	1.5	21668	20.8	9
Pioneer 3379	L 2X	116.0	64.1	1.0	22115	16.1	5
Cargill 7877	L 2X	115.6	58.2	9.7	21892	20.6	14
Crow's 669	L 2X	115.2	56.7	3.7	21110	21.8	12
Agripro AP510	L 2X	115.0	59.9	0.5	21445	20.3	10
Garst 8599	L 2X	112.9	61.2	2.0	22003	14.8	8
Garst 8519	L 2X	112.2	59.8	3.5	22115	19.4	17
Tecnagene DF8812	L 2X	111.6	60.0	2.0	22115	18.8	13
Curry SC1481	L 2X	111.1	60.5	0.0	21668	18.0	11
Top Farm SC1112	L 2X	110.8	60.1	0.5	20886	18.8	15
Agripro AP595	L 2X	110.8	61.4	2.6	21668	18.1	16
Mccurdy 6660	L 2X	110.7	60.8	2.0	22003	18.5	19
Cargill 6927	L 2X	109.9	60.8	0.5	21557	18.3	20
Wilson 1640	L 2X	109.8	60.7	0.0	21892	18.0	18
Northrup King S7751	L 2X	108.8	55.9	5.1	22003	21.3	31
Fontanelle 4280	M 2X	108.3	62.1	0.0	21892	16.8	21
Tecnagene DF8911	L 2X	108.2	60.8	9.1	22003	17.5	29
Cargill 6027	L 2X	108.0	63.3	2.1	21780	16.2	22
Hoegemeyer SX2632	L 2X	108.0	59.3	1.0	22115	19.3	27
NC+ 4616	M 2X	107.8	61.7	4.5	22115	17.1	24
Northrup King N6348	L 2X	107.7	61.7	7.7	21780	16.8	28
Kaltenberg K7500	L 2X	107.2	60.9	0.0	22115	17.8	23
Terra TR1125	L 2X	106.9	62.5	2.0	22003	17.7	26
Fontanelle 4435	M 2X	106.8	61.7	3.0	22115	16.7	25
Asgrow/O'Gold RX706	L 2X	106.6	61.7	7.1	22115	17.3	30
Hawkeye SC56	L 2X	105.6	58.7	4.0	22115	21.0	35
Payco SX925	M 2X	105.3	58.7	4.0	22115	20.5	34
Cenex/LOL 571	L 2X	105.0	61.1	4.1	21668	17.6	32
Hyperformer HS-59	L 2X	104.77	58.5	5.2	21557	20.2	36
McCurdy 6222	L 2X	102.2	61.3	4.6	22003	18.2	37
Crow's 682	L 2X	101.8	59.5	9.1	22003	18.4	40
Jacques 6770	L 2X	101.6	62.3	1.5	21892	15.2	33
Dahlgren DC-545	L 2X	101.4	57.8	3.1	21892	20.9	42
Cargill 6227	L 2X	101.0	57.2	6.1	19881	17.4	38
Dahlgren DC-541	L 2X	99.6	60.7	2.0	21892	18.7	41
Hoegemeyer SX2673	L 2X	99.5	59.4	13.6	22115	18.8	52
Cargill 8127	L 2X	98.6	60.5	4.0	22115	19.6	45

Table 7. Corn Performance-Late Continued.

Brand and Variety	Type and Cross	Yield Bu/A	Avg. Test Weight	Pct. Stalk Lodged	Avg. Plants /acre	Pct. Mosit	Perf. Score Rating
Jacques 7820	L 2X	97.9	58.8	2.5	22003	20.6	50
S-Brand CB1140	L 2X	97.7	61.1	7.1	22003	17.8	48
Garst N6574	L 2X	97.0	63.8	2.0	22115	14.8	39
S-Brand SS-54A	L 2X	96.5	59.4	4.7	21445	18.3	51
Golden Harvest H2486	L 2X	95.1	62.6	4.3	20886	15.4	44
S-Brand SS-57A	L 2X	94.9	62.2	2.6	21557	16.2	46
Curry SC1468	L 2X	94.8	64.1	3.5	22115	14.8	43
Crow's 488	M 2X	94.7	59.8	13.1	22115	18.5	55
NC+ 5158	L 2X	94.3	58.6	6.3	21221	20.2	53
Pfister 2250	L 2X	93.6	63.4	3.5	22115	14.5	47
Interstate IS729	L 2X	92.8	67.1	0.0	21892	15.4	49
Top Farm SX1109	L 2X	91.6	62.1	6.2	21557	17.5	54
Jacques 7770	L 2X	89.5	60.2	0.5	21892	18.6	56
S-Brand SS-55B	L 2X	88.3	61.4	6.8	21445	17.0	58
Interstate IS613	L 2X	87.5	64.0	4.5	22115	15.4	57
Wilson 1670	L 2X	82.3	60.0	5.1	22003	18.6	59
Means		105.2	60.7	3.7	21829	18.1	

LSD .05 = 18.0 CV - 10.6%

S.E.FARM
REPORT

OAT RESEARCH

D. L. Reeves and Lon Hall

Plant Science 89-15

This was the second year of our preliminary herbicide tests. This is a cooperative test with the extension weeds staff which was grown at four locations this year. Six different varieties were used in this test. All plots were sprayed at the recommended stages.

The high rate of each treatment shows what would happen when a sprayer overlaps. in addition, we hope the high rates will help identify oats sensitive to specific herbicides. The high rates of 2,4-D and Dicamba reduced yields 10% more than the low rates when averaged over the four locations this year. Dicamba treatments also had the greatest effect on test weight.

Treatment	Rate Ai lb/A	Yield bu/A	% of upsrayed yield SE Farm	% of upsrayed yield Avg. 4 locations	Test Weight lb/bu
Unsprayed	--	43	--	--	35.1
MCPA amine	.5	45	104	99	35.0
" "	1.0	44	102	101	35.2
2,4-D amine	.5	45	105	93	34.7
" "	1.5	41	95	83	35.0
Bronate	.75	38	88	94	34.7
"	1.5	37	86	93	34.2
Dicamba + MCPA am	.125 + .25	39	90	91	33.8
" "	.25 + .5	31	72	79	32.1

LSD .05 = 4.1 bu.

The test was conducted at four locations so we can gain an idea of how spraying affected the oats in different environmental conditions. This location had the largest reductions due to Bronate at both rates. The difference between locations emphasizes the importance of the growing conditions when determining how herbicides affect oats.

OTHER TESTS: We had three tests with selections from our breeding program plus two regional tests. The early regional test had 32 entries from 8 states. Twelve of these yielded over 50 bu/A with the high yield of 58 bushels. The Tristate is a cooperative test with North Dakota and

Minnesota. This station is the southernmost site for the Tristate with each state using it to test new selections before they go to regional tests. This year 15 of the 36 entries yielded over 50 bu/A. The highest yielder produced 62 bu/A.

The other three tests were selections from our breeding program. In these tests 180 new selections were tested. Since this is our most southern testing site, we test primarily early to midseason maturity selections here.

S.E.FARM
REPORT

FORAGE YIELD AND QUALITY OF SUMMER ANNUAL CROPS AS INFLUENCED BY PLANTING DATE

E.K. Twidwell, A. Boe, and K.D. Kephart

Plant Science 89-16

Introduction

In South Dakota cool-season pastures decline in productivity during the late summer resulting in diminished forage supplies.Crops that are normally used to augment low forage supplies in late summer include annual and perennial warm-season grass pastures, hay, and silage crops. Previous research also indicates that summer annual legumes such as cowpeas and mungbeans are adapted to South Dakota conditions and can produce adequate forage yields. At present it is not well understood how the productivity of these summer annual grasses and legumes is influenced by planting date. In drought conditions producers may be forced to plant summer annual crops in early to mid-summer and hope that they can produce adequate forage yields in a short period of time. The identification of the best species and optimum planting dates to use would be beneficial information. The objective of this study was to measure and compare the forage yield and quality of four summer annual species planted on three dates.

Materials and Methods: Cowpeas, mungbeans, soybeans, and Siberian millet were planted on May 16, June 15, and July 10. Plot size was 3.3 ft. x 10 ft. and row spacing was 10 inches. On each harvest date the center two rows of each plot were harvested for yield determination. The forage was weighed and a one pound subsample was taken for dry matter determination and future forage quality determinations. The millet planted on May 16 was harvested on July 26. The other three species were harvested on August 14. All species from the June and July plantings were harvested on August 14 and September 15, respectively.

Results and Discussion: The species x planting date interaction was not significant, however, the main effects of species and planting date were significant ($P<0.05$). Averaged across planting dates, millet had the highest forage yield (3.7 tons per acre) followed closely by cowpeas (Table 1). Soybeans and mungbeans yielded 1.3 and 1.9 tons per acre lower, respectively, than millet. Averaged across species, the May 16 planting date had the greatest forage yield while delaying planting until July 10 produced the lowest forage yield (Table 1).

Data from the first year of this study indicates that, from a forage production standpoint, cowpeas or millet would be the species of choice. Samples will be analyzed for crude protein, neutral-detergent fiber, and in vitro dry matter digestibility. These data will allow yield and forage quality information to be combined such that pounds of protein or digestible dry matter per acre can be calculated. This study will be repeated in 1990.

Table 1. Forage yield of four species planted on three different dates.

	Planting date in 1989			
Species	May 16	June 15	July 10	Average
	-------------tons per acre-------------			
Cowpeas	3.5	3.1	2.6	3.1^{b}
Millet	3.7	3.8	3.5	3.7^{a}
Mungbeans	1.9	1.8	1.7	1.8^{d}
Soybeans	3.3	2.3	1.5	2.4^{c}
Average	3.1^{a}	2.7^{ab}	2.4^{b}	---

Means in a row or column followed by the same letter are not significantly (P = 0.05) different.

ALFALFA CULTIVAR YIELD TEST

Edward K. Twidwell, Kevin D. Kephart,
and Robin Bortnem

S.E.FARM REPORT

Plant Science 89-17

Two alfalfa cultivar yield experiments were conducted at the SE station during 1989. These tests were conducted to determine yield performance of various alfalfa cultivars and experimental lines when grown in SE South Dakota.

The first study was planted in late April of 1987 and consisted of 35 cultivars (Table 1). Three harvests were obtained during the 1989 growing season. Average total dry matter yield was 2.29 tons per acre and no significant differences were detected among the 35 entries. The average total yield for 1989 was approximately one-third less than the 1988 average yield, presumably because of continuing drought. The second and third harvests were particularly low this year with average yields being 0.49 and 0.67 tons per acre, respectively. No significant differences among cultivars were also found for the 2-year average yield. Our inability to detect significance in this study was probably drought related. Drought stress caused much variability in plant growth within the experiment. As uncontrollable variation increases, the power to detect significant differences among cultivars decreases. Drought conditions have been present at this location for the past 2 years.

The second experiment consisted of 40 alfalfa cultivars and was planted on April 20, 1989 (Table 2). One harvest was obtained in 1989 with an average total dry matter yield of 1.13 tons per acre and no significant differences detected among the cultivars. Drought conditions influenced the growth and development of the plants, and in addition, there is normally a great deal of variation present in seeding-year results. This combined variation did not allow significant cultivar differences to be detected. Of interest in this study is the inclusion of two cultivars that possess multi-leaflet characteristics. The cultivars 'Multi-plier' and 'Legend' are newly developed cultivars in which a proportion of the plants contain more than the standard three leaflets per leaf characteristic. These cultivars have received a great deal of publicity and it will be interesting to observe and measure the performance of these cultivars at this location in future years.

These results are useful in selection of alfalfa cultivars for forage production. Measurements of forage yield taken over several harvests of years are usually more useful than are averages from a single harvest. Also, yield data from the seeding year is of limited use because differences associated with winterhardiness will not be expressed. The results presented reveal that no single cultivar stands out as being superior.

Next years results should prove to be interesting. Rainfall in September should have allowed the drought-stressed plants to recover for next year. Differences among cultivars associated with drought recovery should be expressed.

Table 1. Forage yield of 35 alfalfa cultivars planted April 22, 1987, at the Southeastern Research Station, Beresford, South Dakota.

Cultivar	1987 Total	1988 1-Cut Total	1989 3-Cut 6/4	1989 Cut 1 7/16	1989 Cut 2 8/29	1989 Cut 3 Total	2 3-Cut Avg.[a]	Year Relative Performance[b]
	----------	----------	----------	tons / acre	----------	----------	----------	-- % --
SX 217	0.93	4.67	1.27	0.51	0.70	2.48	3.57	118
DK 135	1.03	4.36	1.32	0.62	0.83	2.77	3.57	118
MTO S82[c]	0.77	4.59	1.45	0.45	0.61	2.51	3.55	117
Vernal	0.69	4.50	1.27	0.45	0.68	2.39	3.45	114
Arrow	0.69	3.79	1.66	0.63	0.79	3.08	3.43	113
FSRC H-170[c]	0.79	4.11	1.27	0.58	0.80	2.64	3.38	111
Saranac	0.80	4.32	1.31	0.42	0.67	2.39	3.35	111
120	0.76	4.10	1.44	0.46	0.71	2.60	3.35	110
Commandor	0.77	3.94	1.22	0.64	0.74	2.60	3.27	108
Iroquois	0.62	4.11	1.36	0.40	0.65	2.41	3.26	108
Cimarron	0.78	3.96	1.29	0.42	0.68	2.40	3.18	105
Mohawk	0.65	4.10	1.19	0.40	0.65	2.23	3.17	104
FSRC H-172[c]	0.84	4.03	1.13	0.54	0.63	2.30	3.16	104
Dynasty	0.95	4.07	1.14	0.49	0.60	2.23	3.15	104
GH 737	0.87	4.15	1.03	0.45	0.67	2.14	3.15	104
636	0.71	4.00	1.15	0.45	0.69	2.29	3.14	104
XPH 2001	0.72	3.92	1.08	0.48	0.67	2.23	3.07	101
5432	0.64	3.70	1.09	0.53	0.75	2.38	3.04	100
Clipper	0.71	3.58	1.07	0.62	0.79	2.49	3.03	100
Apollo Supreme	0.67	3.38	1.21	0.65	0.75	2.62	3.00	99
Dart	0.73	3.63	1.01	0.57	0.66	2.24	2.94	97
Blazer	0.79	3.71	1.14	0.39	0.60	2.14	2.93	97
SX 424	0.67	3.67	0.99	0.49	0.68	2.16	2.92	96
Big 10	0.94	3.66	1.10	0.41	0.61	2.13	2.89	95
Fortress	0.97	3.64	1.02	0.45	0.67	2.14	2.89	95
MTO N82[c]	0.52	3.68	1.25	0.31	0.52	2.08	2.88	95
526	0.59	3.61	1.05	0.50	0.59	2.14	2.87	95
FSRC IH-171[c]	1.03	3.35	0.99	0.54	0.69	2.22	2.78	92
FSRC H-174[c]	0.77	3.38	0.95	0.40	0.60	1.95	2.67	88
Salute	0.64	3.17	0.96	0.49	0.61	2.06	2.61	86
Saranac AR	0.65	3.30	1.00	0.39	0.54	1.93	2.61	86
532	0.62	3.08	0.96	0.44	0.72	2.11	2.60	86
WL 225	0.88	3.03	0.99	0.45	0.55	1.99	2.51	83
Endure	0.63	3.00	0.73	0.44	0.56	1.73	2.37	78
Magnum III	0.94	2.57	0.89	0.52	0.67	2.08	2.33	77
Average	0.76	3.77	1.14	0.49	0.67	2.29	3.03	
Maturity[d]			3.3	5.7	3.9			
LSD(0.05)	NS	NS	NS	NS	NS	NS	NS	

[a] Two year average based on post-establishment year yields, 1988 and 1989.
[b] % Relative Performance = (cultivar 2-yr-average yield)/(2-yr-average of all cultivars.
[c] Experimental line, not currently marketed.
[d] Average harvest maturity. Value based on Kalu and Fick (1983) Index, mean-stage-by-count.

Table 2. Forage yield of 40 alfalfa cultivars planted April 20, 1989, at the Southeastern Research Station, Beresford, South Dakota.

Cultivar	1989 Cut 1 8/29	Relative Performance[a]
	--- tons / acre ---	-- % --
DK 125	1.42	126
Clipper	1.33	118
Centurion	1.31	115
Flint	1.30	115
Sure	1.28	113
Multi-plier	1.25	110
8412[b]	1.22	108
VS 820[b]	1.22	107
Arrow	1.21	107
86I08	1.20	106
WL 225	1.20	106
Action	1.19	105
Dart	1.19	105
636	1.19	105
FSRC 88S[b]	1.19	105
WL 317	1.19	105
420[b]	1.18	104
AP 8610B[b]	1.17	103
VS 775[b]	1.17	103
Saranac AR	1.14	100
Sabre	1.13	100
XAL72	1.12	99
DK 135	1.10	97
Legend	1.10	97
5262	1.08	96
AP 8743[b]	1.08	96
Ultra	1.07	95
Vernal	1.07	95
AP 8735[b]	1.07	94
630	1.06	93
H 174[b]	1.06	93
526	1.06	93
SDHS6[b]	1.04	92
WL 320	1.03	91
Cimarron VR	1.02	90
Chief	1.00	89
SDHL1[b]	0.94	83
Apollo Supreme	0.93	82
VIP	0.90	79
Allegiance	0.88	78
Average	1.13	
Maturity[c]	4.1	
LSD (0.05)	NS	

[a] % Relative Performance = (cultivar 2-yr-average yield)/ (2-yr-average of all cultivars.

[b] Experimental line, not currently marketed.

[c] Average harvest maturity. Value based on Kalu and Fick (1983) Index, mean-stage-by-count.

CORN AND SOYBEAN HERBICIDE DEMONSTRATION

L. J. Wrage, P. O. Johnson, and D. A. Vos

PURPOSE:

Evaluate performance of labeled and experimental herbicides for weed control and crop tolerance. Demonstration plots provide side-by-side comparisons. Plots were used for field tours. Data collected is presented at educational meetings.

METHODS:

Plot Design:		Demonstration	Demonstration
Plot Size:		20'x 50'; each tillage	20'x 50'; each tillage
Previous Crop:		Corn	Corn
Soil:		Silty clay loam; 3.2% OM; 6.2 pH	Silty clay loam; 3.2% OM; 6.2 pH
Crop:		NK 5750	SOI 287
Planted:		4/27/89	5/19/89
Herbicide:	EPP:	4/7/89	-----
	PPI:	4/27/89	5/19/89
	PRE:	4/27/89	5/19/89
	EPOST:	5/19/89	-----
	POST:	6/8/89	6/23/89
Evaluated:		7/16/89	7/16/89
Rainfall:	1st week	.66 inches	.48 inches
	2nd week	.17 inches	.38 inches

RESULTS:

Green foxtail was heavy; yellow foxtail was present in late season. Tall waterhemp was heavy. Differences between plowed and disked seedbed were less consistent than in past years. Half of each plot was cultivated in early season. Visual evaluations for weed control are based on uncultivated plot area.

CORN: Seedbed condition was excellent at planting. Soil moisture was adequate for crop and weed emergence. Rainfall the first week was received in multiple showers and was marginally adequate. Preplant herbicides show below normal control. Compared to the three-year average, weed control was down significantly. This is mainly attributed to the lack of rainfall in significant amounts.

SOYBEANS: Seedbed condition was adequate. Reduced till superior to plowed. Weekly precipitation totals appear adequate for activation of preemergence treatments. However, this moisture was received in more than one shower which lowered their effectiveness. Preplant incorporated treatments had excellent weed control with most preemergence treatments below normal. However, several treatments were above 90 percent control for both grasses and broadleaves.

Table 1 . Corn Herbicide Demonstration

		Percent Weed Control							
		1989				3-Year Average			
		Disked		Plowed		Disked		Plowed	
Treatment	lb/A act.	Gr	Bdlf	Gr	Bdlf	Gr	Bdlf	Gr	Bdlf
PREPLANT INCORPORATED									
Check	--	0	0	0	0	0	0	0	0
Eradicane	4	90	81	92	89	90	73	87	79
Eradicane+atrazine	4+1	95	97	96	95	93	95	91	95
Eradicane+Bladex	4+2	93	91	94	93	94	89	94	92
Eradicane+atrazine+Bladex	4+.5+1.5	92	94	93	93	95	95	94	96
Sutan+	4	86	90	83	92	81	74	79	72
Sutan+ +atrazine+Bladex	4+.5+1.5	93	97	91	96	89	92	92	95
EARLY PREPLANT									
Dual+atrazine	2+1.6	94	97	84	94	--	--	--	--
Dual	2.5	93	86	82	90	--	--	--	--
SHALLOW PREPLANT INCORPORATED									
Dual+atrazine	2+1.6	90	95	80	92	--	--	--	--
Dual	2.5	90	83	80	87	81	67	83	74
Lasso	3	87	80	76	88	79	74	81	79
Check	---	0	0	0	0	0	0	0	0
Atrazine	2.5	62	94	67	95	74	92	81	95
Atrazine+Bladex	.75+2.25	57	93	72	94	--	--	--	--
SHALLOW PREPLANT INCORPORATED & POSTEMERGENCE									
Bladex&Bladex+X-77	2&1.5+.5%	82	96	68	95	--	--	--	--
PREEMERGENCE									
Atrazine	2.5	62	95	60	95	70	93	79	95
Bladex	3	75	96	62	95	78	58	79	67
Dual	2.5	69	94	61	95	78	73	79	84
Lasso	3	78	88	74	93	80	72	85	85
Prowl	1.5	84	83	72	85	69	69	82	75
Ramrod	6	76	88	74	85	84	66	89	79
*Harness	2.5	88	90	78	93	89	86	91	94

Table 1 Continued

Treatment	lb/A act.	1989 Disked Gr	1989 Disked Bdlf	1989 Plowed Gr	1989 Plowed Bdlf	3-Year Average Disked Gr	3-Year Average Disked Bdlf	3-Year Average Plowed Gr	3-Year Average Plowed Bdlf
		Percent Weed Control							
PREEMERGENCE									
*Harness+atrazine	2+1	83	98	81	97	--	--	--	--
Lasso+atrazine	2+1	61	97	73	95	69	91	86	95
Lasso+atrazine+Banvel	2+1+.5	70	93	68	97	--	--	--	--
Lasso+Bladex	2+2	68	95	72	96	81	85	86	92
Dual+atrazine	2+1	64	96	66	95	73	87	82	91
Dual+Bladex	2+2	58	91	68	96	71	75	82	84
*Tandem+atrazine	.75+2	64	96	72	97	--	--	--	--
Atrazine+Bladex	.75+2.25	54	96	55	95	70	76	78	86
Ramrod+Bladex	4+2	87	90	80	95	85	74	89	82
Lasso+Bladex+atrazine	2+1.5+.5	68	97	76	92	78	86	87	93
Dual+Bladex+atrazine	2+1.5+.5	58	96	60	92	72	86	82	91
EARLY POSTEMERGENCE									
Prowl+atrazine	1.5+1	90	95	84	96	84	94	84	95
Prowl+Bladex	1.5+1.5	92	97	86	96	86	88	88	89
Prowl+Bladex+atrazine	1+.6+.6	89	96	83	96	--	--	--	--
Atrazine+COC	1.5+1 qt	71	91	60	96	71	93	79	96
Bladex+X-77	2+.5%	76	92	67	90	79	83	82	86
Tandem+Bladex+X-77	.5+1.5+.5%	77	94	72	95	78	80	84	87
Tandem+Bladex+ atrazine+X-77	.5+1+.5+.5%	86	97	76	95	82	80	81	84
Bladex+atrazine+X-77	1.5+.5+.5%	81	94	72	95	75	84	79	78
PREEMERGENCE & EARLY POSTEMERGENCE									
*Ramrod&Tough+atrazine	4&.45+.6	90	92	85	95	--	--	--	--
Ramrod&Banvel+Bladex	4&.25+1.5	88	95	83	96	92	95	92	96
Ramrod&Banvel	4&.5	75	96	72	97	78	91	86	96
PREEMERGENCE & POSTEMERGENCE									
Ramrod&Banvel	4&.25	72	98	71	97	72	91	83	94
Ramrod&2,4-D amine	4&.5	68	98	72	95	71	87	85	91
Ramrod&Basagran+COC	4&1+1 qt	66	96	75	95	69	91	86	94
Ramrod&Basagran+ atrazine+COC	4&.52+.52+1 qt	74	98	78	96	--	--	--	--
Ramrod&Buctril	4&.38	79	86	72	88	73	86	84	89
Ramrod&Buctril+atrazine	4&.25+.5	80	95	76	96	80	94	89	97
Ramrod&Banvel+atrazine	4&.25+.5	79	96	73	96	78	94	86	95
EARLY POSTEMERGENCE & POSTEMERGENCE									
Banvel&DPX-79406+COC	.5&.0313+1.5 pt	89	97	84	96	--	--	--	--
LSD (.05)						14.1	16.6	12.5	13.1

* Experimental herbicide

Table 2. Soybean Herbicide Demonstration

		Percent Weed Control							
		1989				3-Year Average			
		Disked		Plowed		Disked		Plowe	
Treatment	lb/A act.	Gr	Bdlf	Gr	Bdlf	Gr	Bdlf	Gr	Bdl
PREPLANT INCORPORATED									
Check	----	0	0	0	0	0	0	0	0
Vernam	2.5	70	84	65	86	66	76	72	74
Treflan	.75	94	93	84	88	88	86	85	85
Sonalan	1	96	95	78	84	92	89	86	87
Prowl	1.25	94	88	82	88	89	84	84	86
Treflan+Sencor/Lexone	.75+.38	96	95	79	83	94	96	88	90
Command	1	88	68	84	65	83	51	85	52
Commence	1.31	89	93	82	90	--	--	--	--
Treflan+Command	.75+.75	86	91	84	88	85	86	85	81
Command+Sencor/Lexone	.75+.25	79	93	72	92	87	84	85	74
*Command+Pursuit	.5+.063	94	95	87	92	--	--	--	--
Treflan+Pursuit	.75+.063	93	96	88	88	96	98	93	95
*Treflan+Scepter	.75+.067	90	95	91	90	--	--	--	--
Treflan+Scepter	.75+.125	92	94	92	93	95	97	94	95
Commence+Sencor/Lexone	1.31+.3	91	97	80	83	91	93	90	85
Prowl+Pursuit	.875+.063	84	93	84	88	--	--	--	--
*Prowl+Pursuit	1.25+.032	81	91	80	84	--	--	--	--
*Prowl+Pursuit+Sencor/Lexone	.875+.032+.25	84	93	87	90	--	--	--	--
SHALLOW PREPLANT INCORPORATED									
Lasso	3	70	80	55	75	75	81	75	74
Dual	2.5	66	72	40	60	68	63	70	62
Dual+Command	2+.75	52	65	50	70	72	68	72	65
Lasso+Treflan	2+.5	67	80	67	74	--	--	--	--
Lasso+Pursuit	2+.063	89	92	85	90	--	--	--	--
PREPLANT INCORPORATED & PREEMERGENCE									
Treflan+Sencor/Lexone& Sencor/Lexone	.75+.25&.38	93	95	88	94	95	97	94	97
Treflan&Sencor/Lexone	.75&.5	92	96	92	98	96	98	94	97
PREPLANT INCORPORATED & POSTEMERGENCE									
*Pursuit&Pursuit+X-77	.032&.032+.25%	95	95	96	92	--	--	--	--
PREEMERGENCE									
Amiben	3	78	81	89	90	74	82	92	91
Lasso	3	40	53	50	50	72	77	74	67
Dual	2.5	51	48	40	20	72	70	68	51
Pursuit	.063	92	44	85	40	--	--	--	--

Table 2 Continued

Treatment	lb/A act.	Percent Weed Control							
		1989				3-Year Average			
		Disked		Plowed		Disked		Plowed	
		Gr	Bdlf	Gr	Bdlf	Gr	Bdlf	Gr	Bdlf
PREEMERGENCE (Continued)									
Lasso+Sencor/Lexone	2+.5	68	69	78	62	77	85	76	78
Dual+Sencor/Lexone	2+.5	60	58	65	60	72	79	64	65
Lasso+Pursuit	2+.063	96	91	97	93	--	--	--	--
*Lasso+Pursuit	2+.032	92	78	91	80	--	--	--	--
Lasso+Scepter	2+.125	94	88	92	84	--	--	--	--
Lasso+Amiben	2+2	91	84	88	86	91	91	90	92
Lasso+Lorox	2+1	86	82	86	80	77	78	77	74
Lasso+Amiben+ Sencor/Lexone	3+2+.25	93	87	80	80	94	94	90	92
PREEMERGENCE & POSTEMERGENCE									
Lasso&Pursuit+X-77	2&.063+.25%	98	99	97	90	--	--	--	--
Lasso&Basagran+COC	2&1+1 qt	62	83	60	85	72	89	76	89
Lasso&Blazer/Tackle+X-77	2&.5+.5%	64	90	67	89	78	93	81	93
Lasso&Cobra+X-77	2&.2+.125%	51	87	62	88	73	93	76	87
*Lasso&M6316+X-77	2&.0625+.25%	72	94	69	95	--	--	--	--
Lasso&Blazer/Tackle+ Basagran+X-77	2&.38+.25+.5%	70	81	74	88	80	91	80	94
Lasso&Classic+X-77	2&.016+.25%	92	97	87	95	--	--	--	--
Lasso&Pinnacle+ Classic+X-77	2&.0039+.0039+.25%	89	97	89	96	--	--	--	--
POSTEMERGENCE									
Fusilade 2000+COC	.187+1 qt	95	0	96	0	79	0	82	0
Poast+COC	.2+1 qt	95	0	96	0	91	0	91	0
Whip/Option+COC	.15+1 qt	94	0	94	0	86	0	89	0
Assure+COC	.0875+1 qt	95	0	96	0	--	--	--	--
Pursuit+X-77	.063+.25%	97	98	98	96	--	--	--	--
Pursuit+X-77+28% N	.063+.25%+1 qt	96	94	98	94	--	--	--	--
Poast+Blazer/Tackle+ Basagran+COC	.3+.25+.5+1 qt	0	0	0	0	--	--	--	--
LSD (.05)						16.3	17.4	16.7	19.0

* Experimental herbicide

VELVETLEAF CONTROL IN CORN

L. J. Wrage, P. O. Johnson, and D. A. Vos

PURPOSE:

Evaluate labeled and experimental herbicides for velvetleaf control in corn. Treatments included low rate combinations.

METHODS:

Plot Design:		RCB; 2 reps
Plot Size:		10'x 50'
Previous Crop:		Corn
Soil:		Silty clay loam; 3.2% OM; 6.9 pH
Crop:		NK-S5750
Planted:		5/2/89
Cultivation:		None
Herbicide:	PPI:	5/2/89
	PRE:	5/2/89
	POST:	6/8/89
	LPOS:	6/20/89
Evaluated:		7/27/89
Rainfall:	1st week	.22 inches
	2nd week	.00 inches

RESULTS:

Light natural infestation was overseeded before each of the seedbed tillage operations. Weed pressure was uniform and heavy.

Very dry conditions after planting reduced control of most treatments. Three treatments, all including a postemergence herbicide exceeded 90% control. Preemergence treatments were unsatisfactory.

No significant crop injury was noted. Three year averages are useful in comparing treatments under varied conditions and give a measure of consistency. In comparing, you will note that control in 1989 is significantly lower with the marginal treatments.

Table 3. Velvetleaf Control in Corn.

Treatment	lb/A act.	% Velvetleaf Control 1989	3-Yr. Avg.
PREPLANT INCORPORATED			
Check	----	0	0
Eradicane	4	35	63
Eradicane	6	38	70
Eradicane+atrazine	4+1.5	50	76
Eradicane+Bladex	4+2	55	80
Eradicane+Bladex+atrazine	4+1.5+1	69	83
Bladex	3	65	--
Atrazine	3	72	88
PREPLANT INCORPORATED & POSTEMERGENCE			
Eradicane&atrazine+COC	4&1.5+1 qt.	66	78
Eradicane&2,4-D amine	4&.5	58	77
Eradicane&Buctril+atrazine	4&.38+.5	92	--
PREPLANT INCORPORATED & LATE POSTEMERGENCE			
Eradicane&Banvel	4&.25	86	--
PREEMERGENCE			
Atrazine	3	35	60
Prozine	4	20	54
Bladex+atrazine	3+1	28	57
Lasso+Bladex	2+2	10	46
Dual+atrazine	2+1	22	--
Dual+atrazine	2+2	22	48
Dual+atrazine+Bladex	2+1+1.5	10	46
Lasso+atrazine+Banvel	2+1+.5	80	--
Lasso+Banvel	2+.5	80	--
POSTEMERGENCE			
Prowl+atrazine	1.5+1.5	73	--
Prowl+Bladex	1.5+1.5	88	94
Atrazine+COC	1+1 qt	42	55
Atrazine+COC	2+1 qt	64	75
Bladex+X-77	2+.25%	50	72
Bladex+atrazine+X-77	1.5+.5+.25%	59	80
PREEMERGENCE & POSTEMERGENCE			
Ramrod&Banvel	5&.5	96	86
Ramrod&Buctril+atrazine	5&.38+.5	72	88
Ramrod&Buctril+atrazine	5&.38+1.5	90	92

Table 3. Continued

Treatment	lb/A act.	% Velvetleaf Control 1989	3-Yr. Avg.
PREEMERGENCE & POSTEMERGENCE			
Ramrod&Banvel+atrazine	5&.25+.5	87	78
Ramrod&Banvel+atrazine	5&.25+1.5	87	82
Ramrod&Laddok+28% N	5&1.04+1 gal	85	--
Ramrod&Laddok+Oash	5&1.04+1 qt	86	--
Ramrod&Buctril	5&.38	58	71
Ramrod&M6316+COC	5&.0156+1 qt	74	--
PREEMERGENCE & LATE POSTEMERGENCE			
Ramrod&Banvel	5&.25	60	76
Ramrod&2,4-D amine	5&.5	44	68
PREEMERGENCE & POSTEMERGENCE & LATE POSTEMERGENCE			
Ramrod&Buctril+ atrazine&Buctril	5&.38+1.2&.25	87	94
LSD (.05)		20.7	16.3

VELVETLEAF CONTROL IN SOYBEANS

L. J. Wrage, P. O. Johnson, and D. A. Vos

PURPOSE:

Evaluate labeled and experimental herbicides for velvetleaf control in soybeans. Treatments included low rate combinations.

METHODS:

Plot Design:		RCB; 2 reps
Plot Size:		10'x 50'
Previous Crop:		Corn
Soil:		Silty clay loam; 3.2% OM; 6.9 pH
Crop:		Corsoy 79
Planted:		5/19/89
Cultivation:		None
Herbicide:	PPI:	5/19/89
	PRE:	5/19/89
	POST:	6/23/89
	LPOS:	6/30/89
Evaluated:		7/27/89
Rainfall:	1st week	.48 inches
	2nd week	.38 inches

RESULTS:

The plot area was overseeded to velvetleaf prior to both tillage operations. There are no grassy weeds in the area. Differences are due to velvetleaf control. Limited rainfall was the primary factor in weed emergence and weed control.

Velvetleaf emergence was delayed and somewhat uneven due to dry conditions after tillage. Preplant treatments generally were superior to postemergence applications. Eight treatments exceeded 95% velvetleaf control. These treatments averaged 9.8 bu/A greater yield than the check. One postemergence treatment provided 90% control. Preemergence treatments were generally unsatisfactory. Performance may be down 5 to 10% less in very heavy soil with a long history for the weed. Three-year averages provide a comparison across varied conditions and give a measure of consistency.

Table 4. Velvetleaf Control in Soybeans.

Treatment	lb/A act.	1989 % Vele	1989 Yield bu/A	3-Yr. Avg. % Vele	3-Yr. Avg. Yield bu/A
PREPLANT INCORPORATED					
Check	----	0	24.3	0	17.4
Prowl	1.25	37	29.5	32	22.3
Vernam	2.5	85	30.0	56	21.5
Treflan+Sen/Lex	.75+.38	88	31.7	94	34.0
Command	.75	94	32.3	92	35.4
Command	1	97	31.0	96	33.1
Commence	1.31	92	33.5	90	32.8
Commence	1.74	96	31.4	--	----
*Commence+Pursuit	1.31+.063	96	35.8	--	----
*Commence+Pursuit	1.31+.032	93	31.0	--	----
*Commence+Scepter+ Sen/Lex	1.31+.063+.25	98	35.8	--	----
Commence+Sen/Lex	1.31+.38	98	36.5	97	36.7
Sen/Lexone+Command	.25+.5	97	32.5	97	36.6
Treflan+Scepter	.75+.125	65	29.0	83	32.6
*Prowl+Pursuit	.875+.063	82	37.1	92	31.3
Prowl+Pursuit	.875+.032	74	33.0	--	----
*Treflan+Pursuit+ Sen/Lex	.75+.032+.25	89	34.3	--	----
*Treflan+Pursuit+ Command	.75+.032+.5	97	32.3	--	----
*Scepter+Pursuit	.125+.032	98	37.9	--	----
SHALLOW PREPLANT INCORPORATED					
Lasso+Pursuit	2+.063	84	32.0	--	----
PREPLANT INCORPORATED & PREEMERGENCE					
Treflan&Sen/Lex	.75&.5	48	25.4	--	----
Treflan+Sen/Lex& Sen/Lex	.75+.25+.38	70	35.1	89	30.7
PREEMERGENCE					
Lasso+Sen/Lex	2+.5	25	20.5	64	25.1
Dual+Sen/Lex	2+.5	30	23.0	66	25.9
Lasso+Pursuit	2+.063	67	29.0	--	----
Amiben	3	37	22.6	67	29.2
Lasso+Lorox	2+1	8	18.6	29	15.4
Lasso+Amiben	2+2	28	22.5	64	26.9
PREPLANT INCORPORATED & POSTEMERGENCE					
*Pursuit&Pursuit+ X-77+28% N	.032&.032+.25%+1 qt	87	31.8	--	----
Treflan&Tackle/ Blazer+28% N	.75&.5+1 gal.	54	25.2	--	----

Table 4. Continued

Treatment	lb/A act.	1989 % Vele	1989 Yield bu/A	3-Yr. Avg. % Vele	3-Yr. Avg. Yield bu/A
PREPLANT INCORPORATED & POSTEMERGENCE					
Treflan&Blazer/Tackle+ Basagran+28% N	.75&.25+.5+1 gal	55	25.3	--	----
Treflan&Basagran+28% N	.75&1+1 gal	64	25.9	--	----
Treflan&Basagran+ Dash+28% N	.75&.75+1+1 gal	90	30.3	88	29.1
Treflan&Cobra+28% N	.75&.2+1 qt	64	30.5	--	----
Treflan&Cobra+COC	.75&.2+1 pt	72	26.9	74	23.0
Treflan&Classic+28% N	.75&.0117+1 gal	49	25.3	--	----
Treflan&Pinnacle+ X-77+28% N	.75&.0039+.25%+1 gal	34	26.6	--	----
Treflan&Pinnacle+ Classic+X-77+28% N	.75&.0039+.0026+ .25%+1 gal	70	34.9	--	----
Treflan&Pursuit+X-77	.75&.063+.25%	75	35.0	--	----
Treflan&Pursuit+X-77+ 28% N	.75&.063+.25%+1 gal	86	32.4	74	29.9
PREPLANT INCORPORATED & LATE POSTEMERGENCE					
Treflan&Basagran+28% N	.75&1+1 gal	84	31.4	78	28.0
Treflan&Amiben	.75&2.7	88	29.9	--	----
PREPLANT INCORPORATED & POSTEMERGENCE & LATE POSTEMERGENCE					
Treflan&Basagran+ 28% N&Basagran+28% N	.75&.5+1 gal& .5+1 gal	75	31.8	81	31.2
LSD (.05)		22.2	7.4	18.0	6.6

* Experimental herbicide

VELVETLEAF COMBINATION COMPARISONS

L. J. Wrage, P. O. Johnson, and D. A. Vos

PURPOSE:

To compare preplant incorporated broadleaf treatments in tank-mix combinations for velvetleaf control in soybeans.

METHODS:

Plot Design:	RCB; 2 reps
Plot Size:	10'x 50'
Previous Crop:	Corn
Soil:	Silty clay loam; 3.2% OM; 6.9 pH
Crop:	Corsoy 79
Planted:	5/19/89
Herbicide: PPI:	5/19/89
Evaluated:	7/27/89
Rainfall: 1st week	.48 inches
2nd week	.38 inches

RESULTS:

All treatments are experimental except numbers 4 and 7. Velvetleaf was light to moderate in all plots. Moisture was limited. Significant differences for yield were found between the check and other treatments. Control ratings do suggest some difference between combinations. Six of the treatments averaged above 90 percent control. These treatments will continue to be evaluated for weed control and yield.

Table 5. Velvetleaf Rate Comparison Soybeans

Treatment	lb/A act.	% Vele	Yield bu/A
Check	----	0	17.0
*Scepter+Pursuit	.0625+.032	84	30.3
*Scepter+Sen/Lex	.0625+.25	74	26.7
Scepter+Command	.0625+.5	92	28.1
*Pursuit+Sen/Lex	.032+.25	96	28.6
*Pursuit+Command	.032+.5	94	28.8
Sen/Lex+Command	.25+.5	94	30.5
*Scepter+Pursuit+Sen/Lex	.042+.021+.167	84	28.7
*Scepter+Pursuit+Command	.042+.021+.33	79	29.1
*Scepter+Sen/Lex+Command	.042+.167+.33	85	28.4
*Pursuit+Sen/Lex+Command	.021+.167+.33	90	28.5
*Scepter+Pursuit+ Sen/Lex+Command	.031+.016+.125+.25	96	27.8
LSD (.05)		10.6	2.8

* Experimental herbicide

INTERACTION OF HERBICIDE RATES WITH ROW CULTIVATION IN CONVENTIONAL TILLAGE

L. J. Wrage, P. O. Johnson, and D. A. Vos

PURPOSE:

- Evaluate input levels of herbicide and cultivation for weed control, crop yield and returns in conventional till corn-soybean rotation.
- Determine the long-term effect of reduced levels of weed control on crop yield.
- Determine if herbicide rates can be reduced when used with cultivation.

Producers and research data indicate herbicide rates can be reduced in certain situations. However there is no consideration for long-term effects on weed population and no indication the practice can be continued each year as weed pressure increases. Row cultivation is one option to replace part of the herbicide inputs; however the level of each is not documented.

METHODS:

The study is designed in a corn-soybean rotation. Three herbicide levels representing 100%, 75% and 50% of labeled rate for a preplant, preemergence, and a banded and postemergence treatment are included for each crop. Each herbicide treatment includes 2 cultivation levels. The rotation is designed so the same herbicide and cultivation level will be maintained each year.

		Corn	Soybeans
Plot Design:		RCB; 3 reps	RCB; 3 reps
Plot Size:		20' x 100'	20' x 100'
Soil:		Silty clay loam; 2.9% OM; 6.0 pH	Silty clay loam; 2.9% OM; 6.0 pH
Crop:		Northrup King 4545	Corsoy 79
Planted:		5/1/89	5/19/89
Herbicide:	PPI:	5/1/89	5/19/89
	PRE:	5/1/89	5/19/89
	POST:	6/8/89	6/20/89
Evaluated:		9/19/89	9/19/89
Rainfall:	1st week	.22 inches	.48 inches
	2nd week	.00 inches	.38 inches

RESULTS:

Weed control was evaluated by visual estimates and plant counts. Yields were harvested with field plot combine. The seedbed and soil conditions were excellent; crop stand uniform.

Green foxtail and common lambsquarter were the predominant weed species present in 1989. Weed pressure appears to have increased in some of the non-cultivated preemergence treatments. Plant counts were high in the three non-cultivated preemergence treatments for both corn and soybeans. Grain yield and weed control ratings were significantly lower for these three treatments. A rate response was also evident, with the full rate treatment providing better weed control and higher yields than the half rate of preemergence herbicide. Reduced herbicide rates were adequate when one cultivation was added. However, two cultivations alone resulted in lower yields than when cultivation was combined with a full rate of herbicide.

In the group of non-cultivated treatments, preplant incorporated herbicides had higher yields and lower weed counts than the preemergence treatments.

Data in succeeding years will determine if weed populations are increasing and whether reduced herbicide inputs with cultivation will continue to provide acceptable weed control.

Table 6. Herbicide Rate/Tillage Corn

Treatment	lb/A act.	Grft/* Sq.Yd.	Colq/** Sq.Yd.	% Grft	% Colq	Yield bu/A
PREPLANT INCORPORATED						
Eradicane+Bladex	2+1	1.7	0.5	95	91	123.7
Eradicane+Bladex	3+1.5	0.0	0.3	98	98	126.2
Eradicane+Bladex	4+2	0.0	0.0	99	99	131.7
Eradicane+Bladex+1 Cult	2+1	0.2	0.0	97	99	129.6
Eradicane+Bladex+1 Cult	3+1.5	0.3	0.0	98	99	132.7
Eradicane+Bladex+1 Cult	4+2	0.2	0.0	99	99	132.2
2 Cult	---	3.8	1.0	83	77	112.9
PREEMERGENCE						
Lasso (Band)+2 Cult	3	0.5	2.8	93	85	121.7
Lasso+Bladex	1+1	38.0	3.2	71	78	93.9
Lasso+Bladex	1.5+1.5	14.8	1.7	78	87	112.9
Lasso+Bladex	2+2	10.8	1.8	82	85	117.9
Lasso+Bladex+1 Cult	1+1	5.3	1.7	90	88	130.1
Lasso+Bladex+1 Cult	1.5+1.5	1.3	0.3	93	93	135.3
Lasso+Bladex+1 Cult	2+2	0.5	0.7	97	96	136.1
POSTEMERGENCE						
Bladex+2 Cult	2	7.3	2.2	85	87	123.3
LSD (.05)		9.4	1.8	7.7	9.7	18.5

* Green Foxtail/sq. yd.
** Common Lambsquarter/sq. yd.

Table 7. Herbicide Rate/Tillage Soybeans

Treatment	lb/A act.	Grft/* Sq.Yd.	Colq/** Sq.Yd.	% Grft	% Colq	Yield bu/A
PREPLANT INCORPORATED						
Sonalan+Sen/Lex	.5+.125	0.3	0.5	94	93	27.9
Sonalan+Sen/Lex	.75+.25	0.0	0.2	99	94	28.6
Sonalan+Sen/Lex	1+.38	0.0	0.3	98	94	25.5
Sonalan+Sen/Lex+1 Cult	.5+.125	0.0	0.0	99	98	31.9
Sonalan+Sen/Lex+1 Cult	.75+.25	0.0	0.0	99	99	33.8
Sonalan+Sen/Lex+1 Cult	1+.38	0.2	0.0	99	98	34.5
2 Cult	---	13.2	5.8	75	78	22.7
PREEMERGENCE						
Dual (Band)+2 Cult	2.5	0.7	2.0	92	79	28.8
Dual+Sen/Lex	1+.25	16.7	9.8	67	47	10.7
Dual+Sen/Lex	1.5+.38	15.0	6.8	65	42	13.2
Dual+Sen/Lex	2+.5	5.7	7.3	77	70	17.0
Dual+Sen/Lex+1 Cult	1+.25	2.5	1.0	94	93	33.0
Dual+Sen/Lex+1 Cult	1.5+.38	2.2	0.7	97	90	31.4
Dual+Sen/Lex+1 Cult	2+.5	0.0	0.7	98	94	33.6
POSTEMERGENCE						
Poast+Blazer+COC+2 Cult	.2+.5+1 qt	0.0	1.5	98	93	30.5
LSD (.05)		8.4	3.4	8.0	11.7	4.7

* Green Foxtail/sq. yd.
** Common Lambsquarter/sq. yd.

COCKLEBUR SCREENING/SOYBEANS

L. J. Wrage, P. O. Johnson, and D. A. Vos

PURPOSE:

Evaluate labeled and experimental herbicides for cocklebur control in soybeans.

METHODS:

Plot Design:		RCB; 2 reps
Plot Size:		10'x 35'
Previous Crop:		Soybeans
Soil:		Silt loam; 2.9% OM; 6.0 pH
Crop:		Corsoy 79
Planted:		5/19/89
Cultivation:		None
Herbicide:	PPI:	5/19/89
	PRE:	5/19/89
	POST:	6/21/89
	LPOS:	6/30/89
Evaluated:		Cocklebur - 7/27/89
		Foxtail - 9/26/89
Rainfall:	1st week	.48 inches
	2nd week	.38 inches

RESULTS:

Cocklebur treatments are in a natural infestation. Cocklebur stand was heavy throughout the plot area. Five postemergence treatments in 1989 and for the two-year average are above 90 percent control. Yield is over 10 bushel more than the check. Preplant incorporated treatments gave only fair control and would be considered in light infestations. New treatments look promising and will continue to be evaluated.

Table 8. Cocklebur/Soybean Screening

Treatment	lb/A act.	1989 % Cocb	1989 % Grft	1989 Yield bu/A	2-Yr. Avg. % Cocb	2-Yr. Avg. Yield bu/A
PREPLANT INCORPORATED						
Check	----	0	0	13.1	0	14.5
Scepter	.125	62	95	33.9	77	30.4
Pursuit	.063	61	97	34.5	70	28.4
Scepter+Command	.062+.5	42	88	30.4	--	----
*Pursuit+Command	.032+.5	42	96	30.8	--	----
*Experimental	.5	59	88	34.1	--	----
Sen/Lex	.38	53	82	31.7	68	26.8
PREPLANT INCORPORATED & PREEMERGENCE						
Sen/Lex&Sen/Lex	.38&.25	70	85	34.5	71	28.9
POSTEMERGENCE						
Basagran+COC	1+1 qt	94	0	25.0	96	25.3
Cobra+COC+28% N	.2+1 pt+1 gal	93	18	17.3	92	20.5
Tackle/Blazer+X-77	.5+.5%	63	70	22.2	63	21.2
Classic+X-77	.0117+.25%	93	45	24.4	92	24.8
Pursuit+X-77+28% N	.063+.25%+3 qt	98	94	32.5	96	28.3
Pinnacle+X-77	.0039+.125%	52	13	25.5	44	22.3
Pinnacle+Classic+X-77	.0039+.0039+.06%	84	0	32.3	--	----
LATE POSTEMERGENCE						
Rescue+COC	1.5+1 qt	56	0	23.0	60	23.4
Rescue+Blazer/Tackle+X-77	.75+.125+.5%	50	52	24.6	66	23.6
POSTEMERGENCE & LATE POSTEMERGENCE						
Basagran+COC&Basagran+COC	.5+1 qt&.5+1 qt	94	0	25.4	95	26.0
LSD (.05)		26.2	20.0	10.2	17.5	6.3

* Experimental herbicide

TANK-MIX POSTEMERGENCE COCKLEBUR SCREENING/SOYBEANS

L. J. Wrage, P. O. Johnson, and O. A. Vos

PURPOSE:

To evaluate labeled and experimental combinations of herbicides for postemergence cocklebur control in soybeans.

METHODS:

Plot Design:	RCB; 3 reps
Plot Size:	10' x 40'
Previous Crop:	Soybeans
Soil:	Silt loam; 2.9% OM; 6.0 pH
Crop:	Corsoy 79
Planted:	5/19/89
Herbicide: POST:	7/10/89
Evaluated:	7/27/89

RESULTS:

Treatments were applied postemergence to a natural and uniform infestation of 10 to 11 inch cocklebur. Some of these herbicides may provide better control when applied to small cocklebur. Basagran and Pursuit applied alone and in combination with Pinnacle provided good control of cocklebur and significantly increased soybean yield compared to the untreated check.

Table 9. Tank-Mix Postemergence Cocklebur Screening/Soybeans

Treatment	lb/A act.	% Cocb	Yield bu/A
Check	----	0	17.4
Pinnacle+X-77+28% N	.0039+.125%+3 qt	12	19.1
*Pinnacle+Basagran+ X-77+28% N	.0039+1+.125%+3 qt	88	23.1
*Pinnacle+Basagran+ X-77+28% N	.0039+.5+.125%+3 qt	76	24.5
*Pinnacle+Blazer/Tackle+ X-77+28% N	.0039+.5+.125%+3 qt	45	23.1
*Pinnacle+Blazer/Tackle+ X-77+28% N	.0039+.25+.125%+3 qt	35	23.4
*Pinnacle+Pursuit+ X-77+28% N	.0039+.063+.125%+3 qt	81	26.0
*Pinnacle+Pursuit+ X-77+28% N	.0039+.031+.125%+3 qt	90	25.9
Blazer+X-77	.5+.5%	30	20.8
Basagran+COC	1+1 qt	80	28.6
Tackle+X-77	.5+.5%	43	25.8
Pursuit+X-77+28% N	.063+.25%+3 qt	82	27.5
LSD (.05)		12.9	4.8

* Experimental herbicide

BLACK NIGHTSHADE HERBICIDE EVALUATION

L. J. Wrage, P. O. Johnson and D. A. Vos

PURPOSE:

To compare labeled herbicides for black nightshade control in soybeans. Herbicides are used at label rates specified for this weed.

METHODS:

Plot Design:		RCB; 4 reps
Plot Size:		10' x 50'
Previous Crop:		Corn
Soil:		Silt loam; 2.9% OM; 6.0 pH
Crop:		Glenwood
Planted:		5/19/89
Cultivation:		None
Herbicide:	PPI:	5/19/89
	PRE:	5/19/89
	POST:	7/10/89
Evaluated:		9/22/89
Rainfall:	1st week	.48 inches
	2nd week	.38 inches

RESULTS:

Black nightshade emerged late in a light, but uniform infestation. Tall waterhemp was also present. Little significance was found between treatments with 6 exceeding 90 percent control. Lasso + Dual preplant incorporated was superior to preemergence.

Table 10. Nightshade in Soybeans Screening

Treatment	lb/A act.	1989 % Control BLNS	1989 % Control BDLF	1989 Yield bu/A	3-Year Avg.[1/] % BLNS	3-Year Avg.[1/] Yield bu/A
PREPLANT INCORPORATED						
Check	----	0	0	31.9	0	19.8
Treflan	.75	40	88	45.1	13	35.4
Sonalan	1.25	77	89	47.0	49	30.8
Lasso	3.5	94	93	48.7	89	36.2
Dual	3	87	85	48.3	80	36.1
Sonalan+Lasso	1.25+2.5	94	96	44.3	87	32.6
Sonalan+Dual	1.25+2	94	95	44.7	87	28.4
Prowl+Pursuit	1+.063	84	92	46.1	--	----
Prowl+Scepter	1.25+.12	91	94	47.7	--	----
Command+Sonalan	.75+1.25	88	98	43.8	--	----
SHALLOW PREPLANT INCORPORATED						
Treflan+Lasso	.5+2	75	78	43.7	--	----
PREPLANT INCORPORATED & PREEMERGENCE						
Sonalan&Amiben	1.25&2	92	97	46.0	90	31.4
Sonalan&Lasso	1.25&2.5	96	94	43.4	94	31.3
Sonalan&Dual	1.25&2	89	95	43.7	89	32.2
PREEMERGENCE						
Amiben+Dual	2+2	58	61	38.0	84	33.1
Lasso+Amiben	2.5+2	73	65	41.3	84	36.1
Dual	2.5	64	50	33.4	61	27.2
Amiben	3	56	55	34.1	74	33.9
Lasso	3	68	66	44.4	81	34.1
Check	--	0	0	38.4	0	20.3
PREPLANT INCORPORATED & EARLY POSTEMERGENCE						
Treflan&Cobra+X-77	.75&.2+.125%	89	91	46.6	--	----
PREPLANT INCORPORATED & POSTEMERGENCE						
Treflan&Blazer/ Tackle+X-77	.75&.5+.5%	67	91	47.9	54	33.9
Treflan&Basagran+COC	.75&1+1 qt.	79	89	43.8	44	33.2
Treflan&Blazer/Tackle+ Basagran+X-77	.75&.125+.25+.125%	60	90	46.8	64	34.9
Treflan&Pursuit+ X-77+28% N	.75&.063+.25%+3 qt	86	93	45.6	--	----
Treflan&Pinnacle+X-77	.75&.0039+.125%	41	92	45.5	--	----
Treflan&Classic+X-77	.75&.0117+.25%	19	88	49.3	--	----
LSD (.05)		16.1	10.8	7.7	10.6	5.2

1/ 3 year average is average of 1986, 1987, and 1988 data.

INTERACTION OF HERBICIDE RATES WITH ROW CULTIVATION IN RIDGE-TILL

L. J. Wrage, P. O. Johnson and D. A. Vos

PURPOSE:

- Evaluate input levels of herbicide and cultivation on weed control, crop yield, and returns in ridge-till corn-soybean rotation.
- Determine the long-term effect of reduced levels of weed control.
- Determine if herbicide rates can be reduced with normal operations in ridge-till systems.

Producers frequently suggest weed problems are reduced after 2-4 years of successful ridge-till. This study will evaluate the effectiveness of cultivation with several levels of herbicide inputs.

METHODS:

Three herbicide levels representing 100%, 75% and 50% of full labeled rate for preemergence herbicides and a banded application are compared to an untreated check. The same level of herbicide input will be maintained each year in the corn-soybean rotation.

	CORN	SOYBEANS
Plot Design:	RCB; 3 reps	RCB; 3 reps
Plot Size:	30' x 90'	30' x 90'
Previous Crop:	Soybeans	Corn
Soil:	Silty clay loam; 3.1% OM; 6.0 pH	Silty clay loam; 3.1% OM; 6.0 pH
Crop:	NK 4545	Corsoy 79
Planted:	5/1/89	5/20/89
Herbicide: PRE:	5/1/89	5/20/89
Evaluated:	9/19/89	9/19/89
Rainfall: 1st week	.22 inches	.48 inches
2nd week	.00 inches	.38 inches

RESULTS:

Weed pressure remained light in 1989, the second year of the study. No significant differences in weed control or crop yield were noted for the soybean herbicide treatments. Some differences in kochia control were observed before soybeans were planted. In the corn study, some decreased weed control was noted in the cultivation treatment. Data in future years will determine if low herbicide inputs combined with cultivation will continue to provide adequate weed control.

Table 11. Herbicide Rate/Ridgetill - Corn

Treatment	lb/A act.	Grft/ Sq.Yd.	Bdlf/ Sq.Yd.	% Grft	% Bdlf	Yield bu/A
3 Cult	----	2.0	2.0	86	74	99.1
Lasso+Bladex	1+1	0.2	0.8	95	94	104.0
Lasso+Bladex	1.5+1.5	0.2	0.3	98	96	108.1
Lasso+Bladex	2+2	0.0	1.0	98	96	95.8
Lasso (Band)+ Bladex (Band)	2+2	0.0	2.8	95	88	91.8
LSD (.05)		1.6	1.3	7.0	12.5	NS

Table 12. Herbicide Rate/Ridgetill - Soybeans

Treatment	lb/A act.	Grft/ Sq.Yd.	Bdlf/ Sq.Yd.	% Grft	% Bdlf	% Koch	Yield bu/A
3 Cult	----	0.0	1.3	96	85	68	26.9
Lasso+Sen/Lex	1+.25	0.2	0.3	97	94	70	26.9
Lasso+Sen/Lex	1.5+.38	0.0	0.2	98	96	76	24.6
Lasso+Sen/Lex	2+.5	0.0	0.3	97	94	68	31.0
Lasso (Band)+ Sen/Lex (Band)	2+.5	0.2	2.0	96	82	50	30.6
LSD (.05)		NS	NS	NS	NS	21.6	NS

NO-TILL CORN AND SOYBEAN HERBICIDE DEMONSTRATIONS

L. J. Wrage, P. O. Johnson, and D. A. Vos

PURPOSE:

To compare performance of labeled herbicide programs in three no-till systems; corn on soybean residue, soybeans in corn residue and soybeans in grain stubble. Treatments represent preplant residual, preemergence and postemergence systems that are most promising. The herbicide treatments for corn include some treatments with low atrazine rates to allow rotation to soybeans. Plots are utilized for producer tours and in field training events.

METHODS: Corn on Soybean Residue

Plot Design:		Demonstration
Plot Size:		20'x 80'
Previous Crop:		Soybeans
Soil:		Silty clay loam; 3.2% OM; 6.2 pH
Crop:		Pioneer 3379
Planted:		4/27/89
Herbicide:	FALL:	11/1/88
	EPP:	4/7/89
	PRE:	5/2/89
	POST:	5/19/89
Evaluated:		6/28/89
Rainfall:	1st week	.22 inches
	2nd week	.00 inches

METHODS: Soybean on Corn Stalks

Plot Design:		Demonstraiton
Plot Size:		20' x 100'
Previous Crop:		Corn
Soil:		Silty clay loam; 3.2% OM; 6.2 pH
Crop:		Corsoy 79
Planted:		5/20/89
Herbicide:	FALL:	11/1/88
	EPP:	4/7/89
	PRE:	5/20/89
	POST:	6/20/89
Evaluated:		6/28/89
Rainfall:	1st week	.48 inches
	2nd week	.38 inches

METHODS: Soybeans in Grain Stubble

Plot Design:	Demonstration
Plot Size:	20' x 100'
Previous Crop:	Oats
Soil:	Silty clay loam; 3.2% OM; 6.2 pH
Crop:	Corsoy 79
Planted:	5/20/89
Herbicide: FALL:	11/1/88
EPP:	4/7/89
PRE:	5/20/89
Evaluated:	6/28/89
Rainfall: 1st week	.48 inches
2nd week	.38 inchess

RESULTS:

Foxtail species, tall waterhemp, kochia, and redroot pigweed were present. The plot areas have been maintained in no-till for six seasons. Only maintenance herbicides are used in filler year.

Corn on Soybean Residue. Several treatments had excellent control. Fall panicum is increasing in this area. This is in atrazine treatments or with herbicides weak on this species. Combination treatments have given best control. Yields are an indication of performance, but are not replicated.

Soybeans on Corn Residue. Weed control in these plots is an indication of yield. Some treatments had excellent control of all species.

Soybeans on Grain Stubble. Weed control in this system has been the most consistent of the rotations. Six treatments have better than 90 percent control and eight treatments yielded over 40 bushel. Most of these treatments will continue to be evaluated in future years.

Table 13. No-Till Corn Demonstration

FALL	EARLY PREPLANT	PREEMERGENCE	POSTEMERGENCE	% Weed Control			Yield
				*Grft	Fapa	Tawh	bu/A
Atrazine(3)				83	10	99	118.3
Atrazine(2)+Dual(2.5)				86	71	99	115.8
Atrazine(2)	Dual(2.5)			92	82	98	134.8
	Atrazine(3)			65	12	99	99.0
	Atrazine(2)+Dual(2.5)			87	84	99	134.5
	Atrazine(2)+Lasso MT(2.5)			84	76	98	111.2
	Atrazine(2)	Dual(2.5)		80	33	99	119.5
	Atrazine(1.33)+Dual(1.5)	Atrazine(.66)+Dual (1)		91	86	99	140.7
	Atrazine(.5)+Bladex(1.5)+ Dual(1.5)	Atrazine(.5)+Bladex(1)+ Dual (1)		93	96	99	139.4
	Bladex(2)+Dual(1.5)	Bladex(1)+Dual(1)		80	87	98	123.1
	Atrazine(.5)+Bladex(1.5)		Atrazine(.5)+Bladex (1.5)+X-77 (.125%)	94	90	99	143.2
		Gramoxone(.5)+X-77(.5%)+ Atrazine(1.5)+Dual(2)		85	79	97	127.7
		Gramoxone(.5)+X-77(.5%)+ Atrazine(1)+Bladex(2)+ Dual(1.5)		74	88	95	123.1
		Roundup(.75)+atrazine(1)+ Bladex(2)+Lasso MT(2.5)		70	77	97	117.7
		2,4-D es(1)+COC(1 qt)+ Atrazine(1)+Bladex(2)+ Lasso MT(2.5)		79	91	98	134.5
		Gramoxone(.5)+X-77 (.5%)+Lasso MT(2.5)	Atrazine(1.5)+COC(1 qt)	89	80	96	140.6

* Green Foxtail, Fall Panicum, Tall Water Hemp, respectively

Table 14. No-Till Soybeans in Corn Stalks Demonstration

FALL	EARLY PREPLANT	PREEMERGENCE	POSTEMERGENCE	*Grft	Tawh	Yield Bu/A
Dual(2.5)		Sen/Lex(.5)		71	51	10.2
Dual(1.5)		Dual(1)+Sen/Lex(.5)		86	58	20.7
	Dual(1.5)	Dual(1)+Sen/Lex(.5)		72	89	13.1
	Dual(1.5)	Dual(1)+Pursuit(.063)		93	78	31.6
	Pursuit(.063)+Dual(1)	Dual(1)		96	84	27.5
	Dual(1.5)+Pursuit(.032)+ Scepter(.062)			96	92	41.4
	Dual(3)+Sen/Lex(.38)	Sen/Lex(.33)		96	80	37.3
		Gramoxone(.5)+X-77(.5%)+ Lasso MT(2.5)+Pursuit(.063)		97	72	32.1
		Gramoxone(.5)+X-77(.5%)+ Dual(2.5)+Sen/Lex(.5)		56	58	20.1
		Roundup(.75)+Lasso MT(2.5)+ Sen/Lex(.5)		74	81	24.5
		2,4-D es(.75)+Roundup (.18)+AS+Lasso MT(3)+ Sen/Lex(.5)+COC(1 qt)		69	85	24.5
	Dual(2.5)		Pursuit (.063)	96	80	35.8
	Dual(1.5)+Pursuit(.032)		Pursuit(.032)+X-77(.25%)	96	89	35.6
	Dual(2.5)		Classic(.0026)+M6316 (.0039)+X-77(.125%)+ 28% N(1.5 pts)	87	96	35.9
		Roundup(.18)+AS+2,4-D es(.75)+COC(1 qt)	Poast(.3)+Blazer(.5)+ Basagran(.75)+X-77(.125%)	90	91	39.2
		Paraquat(.5)+X-77(.5%)	Fusilade 2000(.187)+ Blazer(.5)+Basagran (.75)+X-77(.125%)	84	81	35.7

*Green Foxtail, Tall Water Hemp respectively

Table 15. No-Till Soybeans in Stubble Demonstration

FALL	EARLY PREPLANT	PREEMERGENCE	% Control *Grft	% Control Tawh	Yield bu/A
Scepter(.125)+Dual(2.5)			82	98	39.0
Pursuit(.063)+Dual(2.5)			96	99	45.4
Pursuit(.063)+Prowl(1.5)			96	97	46.3
Preview(.375)+Dual(2.5)			71	98	33.7
Pursuit(.032)+Dual(1.5)		Pursuit(.031)+Dual(1)	98	99	41.8
	Pursuit(.063)+Dual(2.5)		96	98	49.6
	Pursuit(.063)+Dual(1.5)	Dual(1)	96	98	45.0
	Preview(.42)+Dual(1.5)	Dual(1)	85	96	40.2
	Pursuit(.063)+Prowl(1.5)		97	97	47.0
	Prowl(1.5)+Sen/Lex(.38)	Sen/Lex(.33)	86	89	32.9
	Surflan(1.5)+Sen/Lex(.38)	Sen/Lex(.33)	92	84	40.3
	Lasso MT(1.5)+Sen/Lex(.38)	Lasso MT(1)+Sen/Lex(.33)	62	86	21.7
	Lasso(1.5)+Sen/Lex(.38)	Lasso(1)+Sen/Lex(.33)	54	83	22.8
	Dual(1.5)+Sen/Lex(.38)	Dual(1)+Sen/Lex(.33)	69	87	25.3
	Harness(1.5)+Sen/Lex(.38)	Harness(1)+Sen/Lex(.33)	77	89	24.8
	Dual(1.5)	Dual(1)+Amiben(2)+Sen/Lex(.25)	85	54	32.4

* Green Foxtail, Tall Water Hemp respectively

FOXTAIL COMPETITION IN CORN

L. J. Wrage, P. O. Johnson, D. A. Vos and D. Sorensen

PURPOSE:

Two studies were initiated to evaluate the effect of foxtail competition on corn yield. One study evaluated four herbicide application programs; the second evaluated performance of experimental postemergence herbicides including the effect of crop stage and herbicide rate on crop safety. Preliminary data indicate excellent postemergence grass control.

METHODS:

		Postemergence Herbicide Timing	Foxtail Removal Systems in Corn
Plot Design:		RCB; 4 reps	RCB; 4 reps
Plot Size:		15' x 50'	20' x 50'
Previous Crop:		Soybeans	Corn
Soil:		----	Silty clay loam; 3.2 OM; 6.9 pH
Crop:		NK 4590	Pioneer 3751
Planted:		5/5/89; 5/15/89; 5/22/89	5/20/89
Insecticide:		Counter-8.7 lbs/A	
Herbicides:	Broadcast:	5/5/89; Dual+atrazine (2+1)	
	PPI:		5/19/89
	PRE:		5/19/89
	EPOS:		6/8/89
	POST:	6/8/89	6/20/89
	LPOS:		6/30/89
Evaluated:		6/16/89	9/26/89
Rainfall:	1st week:		.48 inches
	2nd week:		.38 inches

RESULTS:

Postemergence Herbicide Timing. Plots were established in a no-till system with successive planting dates to provide different crop stages for herbicides applied at one time to eliminate weather factors as a variable. Plots were maintained essentially weed free with early preplant herbicide. Both experimental herbicides provided adequate crop tolerance at lower rates; higher rates represent 2 to 4 times the rate required for weed control. Visual injury ratings below 10-15% did not adversely affect yield.

Foxtail Removal Systems in Corn. Weather conditions affected comparative performance. Foxtail pressure was heavy; yields were reduced over 30 bu/A compared to the best treatments. Incorporated and postemergence treatments provided the best foxtail control. Early removal of foxtail with the Tandem/triazine combination or early application of Accent provided yields equal to the preplant Eradicane. Late application of Accent provided superior grass control to early Accent but yielded 20 bu/A less because of extended early season competition.

Table 16. Postemergence Herbicide Timing

Treatment	lb/A act.	Growth Stage	VCRR 6-16-89	Yield bu/A
Check	----	----	0.0	115.4
*Accent+X-77	.0625+.25%	2-4L	8.8	95.8
*Accent+X-77	.125+.25%	2-4L	20.0	99.3
*Accent+X-77	.25+.25%	2-4L	23.8	102.7
*79406+X-77	.0313+.25%	2-4L	13.8	107.2
*79406+X-77	.0625+.25%	2-4L	15.0	101.0
*79406+X-77	.125+.25%	2-4L	27.5	98.0
Check	----	----	0.0	113.1
*Accent+X-77	.0625+.25%	5-6L	10.0	111.7
*Accent+X-77	.125+.25%	5-6L	16.3	106.4
*Accent+X-77	.25+.25%	5-6L	11.3	110.7
*79406+X-77	.0313+.25%	5-6L	13.8	110.5
*79406+X-77	.0625+.25%	5-6L	17.5	97.0
*79406+X-77	.125+.25%	5-6L	22.5	101.3
Check	----	----	0.0	114.1
*Accent+X-77	.0625+.25%	7-8L	5.0	107.6
*Accent+X-77	.125+.25%	7-8L	3.8	111.2
*Accent+X-77	.25+.25%	7-8L	10.0	111.3
*79406+X-77	.0313+.25%	7-8L	6.3	108.4
*79406+X-77	.0625+.25%	7-8L	5.0	115.3
*79406+X-77	.125+.25%	7-8L	7.5	104.1
LSD (.05)			7.4	17.7

* Experimental Herbicide

Table 17. Foxtail Removal Systems in Corn

Treatment	lb/A act.	% Grass	Yield bu/A
PREPLANT INCORPORATED			
Check	----	0	51.8
Eradicane	4	92	85.2
PREEMERGENCE			
Dual	2.5	55	66.6
EARLY POSTEMERGENCE			
Tandem+Bladex+atrazine	.5+1+.5	70	89.4
*Accent+COC	.0312+1.5 pt	80	89.8
POSTEMERGENCE			
*Accent+COC	.0312+1.5 pt	72	82.0
LATE POSTEMERGENCE			
*Accent+COC	.0312+1.5 pt	88	69.1
LSD (.05)		15.5	16.0

* Experimental Herbicide

FOXTAIL AND VOLUNTEER CORN CONTROL IN SOYBEANS

L. J. Wrage, P. O. Johnson, and D. A. Vos

PURPOSE:

To evaluate performance of postemergence herbicides for foxtail and volunteer corn control when the grass herbicide was used at high and low rates in combination with broadleaf herbicides and additives.

METHODS:

Plot Design:		RCB; 3 reps
Plot Size:		10' x 50'
Previous Crop:		Corn
Soil:		Silty clayloam; 3.2 OM; 6.2 pH
Crop:		Elgin 87
Planted:		5/20/89
Herbicide:	POST:	6/21/89
	LPOS:	6/30/89
Evaluated:		7/27/89

RESULTS:

Volunteer corn control was very good with several treatments. Antagonistic reactions from the broadleaf component were not evident for volunteer corn and only indicated as a slight effect for foxtail control. Pursuit provided only partial corn control, several "grass" herbicides were more effective on volunteer corn than foxtail.

Table 18. Postemergence Grass Control-Soybeans

Treatment	lb/A act.	Percent Control Corn	Percent Control Grass
POSTEMERGENCE			
Check	--	0	0
Pursuit+X-77+28% N	.063+.25%+1 qt	23	89
*Pursuit+Poast+ COC+28% N	.032+.094+1 qt+1 gal	62	85
*Pursuit+Poast+ COC+28% N	.063+.094+1 qt+1 gal	77	85
Poast+Dash+28% N+ Blazer/Tackle+Basagran	.1875+1 qt+1 gal+ .25+.5	90	89
Poast+COC	.1875+1 qt	97	98
Poast+COC	.14+1 qt	96	91
Poast+COC+28% N	.1875+1 qt+1 gal	96	96
Poast+COC+Basagran	.1875+1 qt+1	96	91
Poast+Dash+Basagran	.1875+1 qt+1	97	93
Poast+Dash+Blazer/ Tackle	.1875+1 qt+.5	97	95
Poast+Cobra+Dash	.1875+.2+1 qt	98	91
*Poast+Dash+Pinnacle	.1875+1 qt+.0039	98	95
Fusilade+COC	.094+1 qt	95	65
Fusilade+COC	.1875+1 qt	98	86
Fusilade+COC+Basagran	.1875+1 qt+1	96	45
Fusilade+COC+Blazer/ Tackle	.1875+1 qt+.5	98	81
Fusilade+Cobra+COC	.1875+.2+1 qt	97	73
*Fusilade+Pinnacle+COC	.1875+.0039+1 qt	96	72
Whip/Option+COC	.1+1 qt	96	94
Whip/Option+COC	.15+1 qt	97	93
Whip/Option+COC+ Basagran	.15+1 qt+1	96	96
Assure+COC	.0625+1 qt	98	95
Assure+COC	.0875+1 qt	98	96
Assure+COC+Basagran	.0875+1 qt+1	88	82
*Assure+Pinnacle+COC	.0875+.0039+1 qt	97	95
LATE POSTEMERGENCE			
Poast+COC	.1875+1 qt	49	88
Fusilade+COC	.1875+1 qt	91	72
Whip/Option+COC	.15+1 qt	68	82
Assure+COC	.0875+1 qt	97	93
LSD (.05)		13.2	13.7

* Experimental herbicide

S.E.FARM
REPORT

GRASSHOPPER RESEARCH

D. D. Walgenbach, B. W. Fuller
and M. A. Boetel

Plant Science 89-19

Introduction:

Grasshopper population densities varied greatly in eastern South Dakota during 1989. Grasshopper counts in ditch and field border areas ranged from less than 5 to more than 150 grasshoppers per square meter. Many farmers reported grasshoppers at levels which caused considerable field margin damage and necessitated the use of pesticides to avoid unacceptable economic losses. This report includes two separate tests which were designed to assist growers in battling future grasshopper outbreaks. In test #1, we investigated the use of Asana (Fenvalerate) and 3 rates of XLR Sevin (Carbaryl) to determine their residual control of grasshoppers in alfalfa and bromegrass. Test #2 involved the treatment of roadside ditches with poison bran baits to reduce grasshopper population in these hatching areas prior to their movement into crop land.

Materials and Methods:

TEST #1: The alfalfa and bromegrass (ca. 1 m tall) field was divided into a checkerboard grid pattern and liquid sprays of the pesticides (Asana 0.031 lbs; Sevin 0.5, 0.75 1.0 lbs AI/ac) were applied in alternating blocks (4,047 square meters) which allowed for all treated blocks to be surrounded in all four sides by untreated blocks. These untreated areas served as reservoirs for grasshoppers to move back into treated areas, thus allowing our assessment of residual control by these compounds. A fifth treatment in this study included an untreated plot which was setup in the same manner as sprayed blocks. A randomized complete block design with four replications was utilized. Forty 1/10 square meter aluminum rings were placed in the central portion of each treatment blocks. Population estimates were taken by counting all grasshoppers within these rings on 0, 5, 12, 16, and 30 days post- application. Counts from the untreated blocks were used in Abbott's formula to adjust for natural fluctuation in grasshopper population dynamics and to calculate the mean percent reductions. Data were analyzed using the General Linear Model (GLM) analysis, and means were compared using Duncan's multiple range test (SAS Institute 1985).

TEST #2: Roadside ditches which bordered corn or soybeans were sampled for grasshoppers. Treatments of several pesticide and application rates were used with a Brie-mar Model 60 bran bait applicator which was placed in the back of a pickup truck, were applied at two locations. A completely random design with 4 replications was used. These treatments were applied in the direction of the wind (less than 5 mph) to insure a uniform dispersal of bran flakes and to produce a swath of approximately 13 m. Pre- and post-treatment counts were made using 8 sweeps with a standard collection net to approximate one square meter of area. The foliage height varied greatly (0.3 to 1 m), however no mowed roadside areas were chosen. Melanoplus bivittatus (Say) was the dominant species present during both ditch studies. Care was taken to locate ditches which contained a minimum of 20 grasshoppers per square meter. Individual treatments were applied in a 13m swath for a length of 61.5m. Low wind (less than 10mph) and warm temperatures (above 16 degrees C) were required for accurate counts since grasshopper activity is important when sampling with sweep nets. Thus, posttreatment sampling dates varied due to weather conditions but were normally 4 to 7 days following bran application. Data were subjected to the analysis procedures as previously discribed in Test #1.

Results and Discussion:

TEST 1: Grasshopper control was evidenced with all spray application (Table 1). The 3 rates of XLR Sevin were significant $P < 0.05$ during the earlier sampling dates, however acceptable control was apparent with all rates through 30 days postapplication. This would promote the possiblility of using a reduced rate of XLR Sevin, thus allowing it to become more competitive with other pesticides on a cost per acre basis.

Table 1. Mean percent grasshopper reduction from preceeding counts in untreated controls using four treatments to control *M. bivittatus*, *M. differentialis*, and *M. femurrubrum*, Bruce, SD, 1989.

Treatment	Rate (lb/ac)	Days Post Application 0	5	12	16	30
				Live grasshoppers/m^2 (Percent reduction)		
Untreated	-----	49.0	28.1	26.2	25.2	16.2
Asana	0.031	46.1	0.8 (96.8a)	1.1 (96.6a)	2.5 (93.6a)	4.4 (80.5a)
Sevin	1.000	41.9	1.6 (91.4ab)	2.7 (90.4ab)	3.6 (89.7a)	5.3 (79.5a)
Sevin	0.750	42.2	2.7 (83.8bc)	4.1 (85.5bc)	6.4 (79.8b)	6.4 (72.1a)
Sevin	0.500	40.9	3.6 (80.8c)	6.5 (81.2c)	9.4 (70.6c)	4.6 (80.8a)

Means within columns followed by the same letter are not significantly ($P \geq 0.05$) different using Duncan's multiple range tests.

TEST #2: The amount of control provided by bran bait treatments to ditch and border areas varied greatly and may have been strongly effected by the plant canopy present at a test site. At the first test location, 4 pounds per acre of bran flakes provided greater control with 1% Lorsban and 2% Sevin than was observed with 2 pounds per acre treatment, however, this was not true for 3% Lorsban (Table 2).

Table 2. Mean percent grasshopper reduction for controlling primarily *M. bivittatus* in a ditch area near White, South Dakota, 1989.

Treatment	Rate (lbs/ac)	Formulation (%)	Precount (sq m)	Percent grasshopper reduction
Lorsban	2.0	1.0	17.5	22.3 a
Lorsban	4.0	1.0	15.0	61.6 a
Lorsban	2.0	3.0	25.5	78.3 a
Lorsban	4.0	3.0	24.8	75.5 a
Sevin	2.0	2.0	24.0	57.9 a
Sevin	4.0	2.0	18.5	71.5 a

The second ditch study (Table 3) was more erratic and control varied greatly. We feel this may have related to the great amount of grass foliage present in these ditch areas. The more dense canopy may have provided a more accessible food source for the foraging grasshoppers, thus reducing the likelihood of a grasshopper encountering the toxic bran flakes.

Table 3. Mean percent grasshopper reduction (7 d posttreatment) for controlling primarily *M. bivittatus* in a ditch area near White, South Dakota, 1989.

Treatment	Rate (lbs/ac)	Formulation (%)	Precount (sq m)	Percent grasshopper reduction
Dimilin	2.0	1.0	74.3	38.6 a
Dimilin	4.0	1.0	55.3	42.3 a
Sevin	2.0	2.0	40.3	------ *
Sevin	4.0	2.0	39.3	7.6 a
Sevin	2.0	5.0	79.8	33.1 a
Sevin	4.0	5.0	46.8	------ *

*No measured reduction.

S.E.FARM
REPORT

COMPARATIVE EFFICACY OF CORN ROOTWORM INSECTICIDES AND APPLICATION RATES, 1989

David Walgenbach, Mark Boetel,
and Billy Fuller

Plant Science 89-20

INTRODUCTION

Three studies were conducted during the 1989 growing season to evaluate the efficacy of commonly used corn rootworm insecticides. Two Lake Andes sites and one site at Garretson served as locations for the study. All insecticide trials were conducted in dryland cornfields that had high adult corn rootworm populations during the fall of the previous season.

The first study was established to compare the standard recommended application rates with reduced rates of presently registered granular compounds. Our intention in this experiment was to provide the grower with a reasonable margin of safety against losses due to corn rootworm damage while, at the same time, reducing insecticide application costs and minimizing the adverse effects of pesticides upon the environment.
The second and third studies were set up to evaluate a number of new compounds against some of the standard commercially-available products.

MATERIALS AND METHODS

The experimental design for all studies was a randomized complete block with four replications. Insecticide treatments were applied using both banded (B) and in-furrow (F) placement methods. Individual treatment plots consisted of single rows, 50 feet in length, with 38 inch row spacing. Granular formulations of insecticides were applied with modified Noble metering units mounted on a specially-adapted Kinze, 4-row corn planter. The metering units were ground-driven, and all units were calibrated on the planter. Insecticide granules were applied in a 7-inch band in front of the furrow-closing wheels and incorporated by the wheels and drag chains. In-furrow applications were directed immediately between the double disk furrow openers. Wilson brand 1100 was the corn variety utilized, and it was seeded at a rate of 22,100 kernels per acre at all study locations. Five roots per replication were dug from each treatment. Roots were washed, examined for rootworm feeding damage, and rated in accordance to the Iowa 1 to 6 scale. These ratings were used to calculate the percent root protection provided by each insecticide treatment.

RESULTS ANO DISCUSSION

Sufficient levels of soil moisture were present at all locations. Rootworm infestations ranged from moderate to heavy which resulted in corn roots within untreated rows being heavily damaged in most test plots.

Table 1. Percent root protection of 22 granular corn rootworm insecticides at three locations in southeastern South Dakota (Study 1).

Insecticide	Place-ment	Pounds AI/acre	Percent Root Protection			
			Garret-son	L. Andes site 1	L. Andes site 2	Ave.
Counter 15G	F	0.750	65.5	78.3	76.4	73.4
Counter 15G	B	0.500	70.7	81.0	62.9	71.5
Counter 15G	B	0.750	73.1	93.2	70.8	79.0
Counter 15G	B	1.000	68.0	79.6	76.4	74.7
Lorsban 15G	F	0.750	56.3	62.0	57.3	58.5
Lorsban 15G	B	0.500	68.4	52.8	58.1	59.8
Lorsban 15G	B	0.750	70.7	48.4	42.7	53.9
Lorsban 15G	B	1.000	70.7	60.6	51.7	61.0
Dyfonate II 20GM	B	0.500	64.9	66.0	55.1	62.0
Dyfonate II 20GM	B	0.750	68.4	63.3	62.9	64.9
Oyfonate II 20GM	B	1.000	75.3	60.6	61.8	65.9
Thimet 20G	B	0.500	50.8	60.6	49.4	53.6
Thimet 20G	B	0.750	45.0	79.6	64.0	62.9
Thimet 20G	B	1.000	54.3	86.4	78.7	73.1
Force 1.5G	F	0.075	59.0	55.2	49.4	54.5
Force 1.5G	B	0.050	62.5	53.8	55.1	57.1
Force 1.5G	B	0.075	73.1	70.1	46.1	63.1
Force 1.5G	B	0.100	69.6	67.4	50.6	62.5
Fortress 10G	F	0.200	80.3	62.0	70.8	71.0
Fortress 10G	F	0.250	73.1	75.5	83.1	77.2
Fortress 10G	F	0.300	78.9	89.1	77.5	81.8
Fortress 10G	B	0.250	74.2	63.3	58.4	65.3

In the first study, significant differences in efficacy were not observed between 1/2 of, 3/4 of, and the full recommended rates of Dyfonate and Force at any of the 3 locations used (Table 1). Also, differences were not detected between the 3 rates of Counter and Lorsban in 2 of 3 locations.

As mentioned earlier, a safety factor for adequate crop protection must be established. This may be difficult to achieve at 1/2 of the recommended rates of these compounds due to problems associated with equipment failure and calibration error. However, using 3/4 of the normal application rate may be a more realistic approach. When statistical comparisons were made between 3/4 of, and the full recommended rate of these compounds, significant differences in percent root protection did not exist at any of the study sites for Counter, Lorsban, Dyfonate, or Force. Additionally, the 3/4# rate did not differ significantly from the 1# rate of Thimet at 2 of the three locations.

These results suggest that the grower must consider the compound being applied. A savings of 25% in application costs may be achieved while maintaining excellent crop protection by using 3/4 of the recommended rate of Counter, Lorsban, Dyfonate or Force.

Table 2. Percent root protection of 11 granular corn rootworm insecticides at three locations in southeastern South Dakota (Study 2).

Insecticide	Placement	Pounds AI/acre	Percent Root Protection			
			Garretson	L. Andes site 1	L. Andes site 2	Ave.
Lorsban 15G	F	1.000	52.9	65.1	58.7	58.9
Lorsban 15G	B	1.000	67.1	60.3	56.0	61.1
Counter 15G	F	0.500	54.3	87.3	68.0	69.9
Counter 15G	F	1.000	62.9	82.5	80.0	75.1
Counter 15G	B	0.500	62.9	82.5	68.0	71.1
Counter 15G	B	1.000	64.3	81.0	72.0	72.4
Brace 10G	F	0.500	62.9	74.6	72.0	69.8
Brace 10G	B	0.500	70.0	68.3	61.3	66.5
Brace 4E	F	0.500	52.9	85.7	66.7	68.4
Brace 4E	B	0.500	70.0	71.4	60.0	67.1
Brace 4E	B	1.000	55.7	81.0	69.3	68.7

Moderate to heavy rootworm beetle populations were also present in the second and third studies. As is presented in tables 2 and 3, many differences in percent root protection were detected between compounds, rates, and placement (band vs. in-furrow) methods.

Table 3. Percent root protection of 15 granular corn rootworm insecticides at two locations in southeastern South Dakota (Study 3).

Insecticide	Place-ment	Pounds AI/acre	Percent Root Protection			
			Garret-son	L. Andes Site 1	L. Andes Site 2	Ave.
Broot 15G	B	1.000	64.8	----	61.9	63.4
Counter 15G	F	0.500	61.0	----	68.8	64.9
Counter 15G	F	0.750	64.8	----	75.0	69.9
Counter 15G	F	1.000	----	----	87.5	87.5
Counter 15G	B	1.000	69.5	----	68.4	69.0
Fortress 5G	F	0.250	74.6	----	61.2	67.9
Fortress 5G	B	0.150	78.1	----	38.8	58.5
Fortress 5G	B	0.250	77.1	----	58.8	68.0
Fortress 5G	B	0.300	74.3	----	55.0	64.7
Fortress 5GM	F	0.250	66.7	----	53.8	60.3
Fortress 5GM	B	0.250	66.7	----	41.2	54.0
Fortress 10G	B	0.250	77.1	----	64.5	70.8
Furadan 15G	F	0.500	41.9	----	68.8	55.4
Furadan 15G	F	0.750	38.1	----	80.0	59.1
Furadan 15G	F	1.000	43.8	----	73.8	58.8

S.E. FARM
REPORT

FEEDLOT RESEARCH UPDATE

Carl P. Birkelo, Ph.D.
Assistant Professor, Ruminant Nutrition

Animal/Range Sciences 89-21

Several research projects are currently underway or planned for the near future at the SE Farm Feedlot. They involve a number of aspects of feedlot cattle nutrition and management such as environmental effects on protein requirements and bunk management, feed preservation and handling, and roughage sources for finishing diets. They are all designed to provide information that will help improve efficiency of beef production in the feedlot. The following are brief descriptions of these projects, their objectives and current status.

<u>Title: The effect of environment on restricted vs. ad libitum feeding of finishing diets to yearling cattle.</u>

The restricted feeding of finishing diets (approximately 90 to 95% of ad libitum) improves feed efficiency without altering gain in some situations. Environmental temperature may affect the response of cattle to restricted feeding because of reduced cold tolerance. The objective of this study is to determine if restricted feeding is a viable management tool in winter as well as summer. This study is currently entering its winter phase. The summer phase was completed in the fall of 1989.

<u>Title: Improving the use of crude protein during thermal stress.</u>

Thermal stress due to heat and cold can reduce average daily gain when it becomes excessive. Reduced gain should result in a lower protein requirement. It has been shown in laboratory conditions that efficiency of crude protein use can be improved by reducing diet crude protein according to expected temperature-caused reductions in gain. The objective of this study is to determine whether crude protein efficiency can be improved in practical feedlot conditions by reducing diet crude protein according to the degree of expected thermal stress.

<u>Title: The effect of mixing wet distillers grains with oat hulls and/or salt to improve handling/storage characteristics in cold weather.</u>

Wet distillers grain is a by-product of ethanol production. High moisture content causes problems with freezing in cold weather and spoilage but drying is expensive. The objective of this study is to determine the effects of adding oat hulls and/or salt to wet distillers grains on its handling/storage characteristics in cold weather and subsequent feeding value. Preliminary lab work was begun in the summer of 1989 to screen potential combinations and the cattle feeding study was begun that fall. This project was funded by a grant from the South Dakota Corn Utilization Council.

Title: The effectiveness of wet distillers grains/oat hull fiber as a feedlot roughage source.

Roughages for feedlot diets can be expensive, difficult to handle and hard to locate in times such as drought. Both wet distillers grains and oat hulls are high in fiber and are potential sources of roughage in feedlot finishing diets. If it is found that adding oat hulls to wet distillers grains improves its handling/storage characteristics in cold weather, it would be advantageous from an economical and practical standpoint to eliminate other roughages from the diet. The objective of this study is to determine if fiber present in a combination of wet distillers grains and oat hulls can replace conventional roughages in feedlot finishing diets. This study is planned for fall of 1990 and is funded by a grant from the South Dakota Corn Utilization Council.

Title: The effect of Ecosyl on high moisture corn fermentation characteristics and cattle performance.

There are many silage additive products available today. Most are microbial inoculants (i.e. viable bacteria) that when added to silage frequently increase the rate and extent of fermentation and, as a result, reduce nutrient loss. Ecosyl is one such product. Previous work has focused on its use with alfalfa and corn silage. However, ensiling of high moisture corn also results in some nutrient loss. The objective of this study is to determine the effect of Ecosyl in its original or modified form on fermentation characteristics of high moisture corn grain and the performance of cattle fed this corn in high grain finishing diets. Approximately 200 ton of treated and untreated high moisture corn were ensiled in bags September, 1989. Serial samples from each bag were taken for 56 d after ensiling for lab analyses and the cattle feeding study will be conducted during the summer, 1990. This project is funded by a grant from ICI Americas, Inc.

S.E.FARM
REPORT

EFFECT OF NUTRIENT DENSITY ON GROWING-FINISHING PIG PERFORMANCE DURING SUMMER MONTHS

R. C. Thaler and E. M. Weaver[1]

Animal/Range Sciences 89-22

Summer temperatures in South Dakota often exceed the pig's upper critical temperature. In an effort to reduce heat stress, the pig eats less feed. Since the pig is then consuming fewer total nutrients per day, performance is often reduced. This "summer stall-out" can back up finishing facilities and reduce overall profitability.

One possible method to alleviate summer lag is to increase the nutrient density of the diet. In this case, even though the heat-stressed pig is consuming less feed, it could still be receiving the required amount of essential nutrients since each bite of feed contains more of the essential nutrients. The objective of this study, therefore, was to determine if increasing the energy and/or lysine levels of the diet would offset the summer stall-out in performance.

(Key Words: Grow-finishing Pigs, Nutrient Density, lysine, Soybean Oil.)

Experimental Procedures

A total of 112 purchased feeder pigs weighing approximately 45 pounds were allotted by weight, sex, and source of one of four dietary treatments upon arrival at the farm on July 21, 1989. There were four replicates/treatment with seven pigs/pen. Individual pig weights and feed consumption were determined every two weeks. When pen weights within a replicate averaged 110 pounds, the pigs were switched from the grower diet to the finishing diet. The experiment was terminated when average pen weight within a replicate reached 230 pounds.

Standard corn-soybean meal growing and finishing diets that met or exceeded all NRC nutrient requirements were fed from 45 to 110 pounds, and from 110 to 230 pounds, respectively. Energy additions were made with 3% soybean oil additions and lysine levels increased by the addition of L-lysine HC1 (Tables 1 & 2). The resulting 2 x 2 factorial arrangement of treatments is as follows:

	% Lysine		
Treatment	Grow	Finish	% Soy Oil
A	.75	.60	0
B	.75	.60	3
C	.85	.70	0
D	.85	.70	3

[1] The authors gratefully acknowledge the assistance of Roland Hanson in conducting the trial.

Table 1. Grower Diet Composition (pounds per ton of feed).

Supplemental Lysine	-	-	+	+
Supplemental Oil	-	+	-	+
Corn	1564.7	1493.8	1564.7	1493.8
Soybean Meal (44%)	381.0	391.7	381.0	391.7
Dicalcium Phosphate	22.3	23.0	22.3	23.0
Limestone	17.0	16.5	17.0	16.5
Salt	5.0	5.0	5.0	5.0
Vit-Min Premix	10.0	10.0	10.0*	10.0**
Soybean Oil	-	60.0	-	60.0
	2000.0	2000.0	2000.0	2000.0

* Premix contains 2.6 pounds L-lysine HCl.
** Premix contains 2.5 pounds L-lysine HCl

Results and Discussion

Performance data are shown in Table 3. Average daily gain (ADG), average daily feed intake (ADFI), and feed efficiency (F/G) were not affected by treatment in the grower, finishing, or overall grow-finish phases. This response could be attributed to two factors. First, summer temperatures were not extreme so the pigs were seldom, if ever, heat stressed, and a stall-out did not appear to occur. This is illustrated by the high level of performance exhibited by the pigs consuming the control diet. Secondly, there was a large amount of variation in performance within pen which could have masked any treatment effect.

Though not statistically different, there was a trend for the means for ADFI to be lower and F/G to be improved in the latter growth phases when the diets were supplemented with either lysine or soybean oil. These would be the type of responses one would expect in a heat-stressed situation.

Summary

A total of 112 feeder pigs were fed either a basal diet or diets supplemented with soybean oil and/or synthetic lysine in order to offset the "stall-out" in performance often observed in the summer by increasing the nutrient density of the diet. At no time in the grower, finishing, or overall grow-finishing phases was performance affected by dietary treatment. However, performance was acceptable and a stall-out did not appear to occur.

Table 2. Finishing Diet Composition (pounds per ton of feed).

Supplemental Lysine	-	-	+	+
Supplemental Oil	-	+	-	+
Corn	1682.8	1611.6	1682.8	1611.6
Soybean Meal (44%)	268.7	279.6	268.7	279.6
Dicalcium Phosphate	19.1	19.8	19.1	19.8
Limestone	14.4	14.0	14.4	14.0
Salt	5.0	5.0	5.0	5.0
Vit-Min Premix	10.0	10.0	10.0*	10.0**
Soybean Oil	-	60.0	-	60.0
	2000.0	2000.0	2000.0	2000.0

* Premix contains 2.6 pounds L-lysine HCl.
** Premix contains 2.5 pounds L-lysine HCl.

Table 3. Performance Data.

Supplemental Lysine	-	-	+	+
Supplemental Oil	-	+	-	+
Grower				
Daily gain, lb	1.62	1.69	1.68	1.62
Feed intake, lb	3.75	3.83	3.81	3.77
Feed/gain	2.32	2.26	2.27	2.33
Finishing				
Daily gain, lb	1.73	1.79	1.80	1.77
Feed intake, lb	5.65	5.46	5.55	5.25
Feed/gain	3.32	3.06	3.09	2.96
Grow-Finish				
Daily gain, lb	1.68	1.75	1.75	1.71
Feed intake, lb	4.76	4.72	4.77	4.58
Feed/gain	2.85	2.71	2.73	2.69

NOTES

NOTES

NOTES

NOTES

S.E. FARM
REPORT